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POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN. PROCEEDINGS OF CONFERENCE HELD AT CHICAGO, ILLINOIS ON JANUARY 31, FEBRUARY 1-2, FEBRUARY 5-7, 1968. EXECUTIVE SESSION, MARCH 7, 8 AND 12, 1968. VOLUME IV

Federal Water Pollution Control Administration
Washington, D. C.

March 1968

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Volume 4

ILLINOIS
INDIANA

Chicago, Illinois
Jan. 31, Feb. 1–2, Feb. 5–7, 19[illegible]
Executive Session
March 7, 8 and 12, 1969

CONFERENCE

Pollution of Lake Michigan and its tributary basin

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MONDAY, FEBRUARY 5, 1968

MORNING SESSION

(9:30 a.m.)

MR. STEIN: We will call on Illinois this morning.

ILLINOIS PRESENTATION (CONTINUED)

MR. MORTON: Mr. Klassen is temporarily on the telephone, but we would like to proceed with the Illinois Presentations.

At this time we would like to introduce Mr. James Vaughn, who is Engineer of Water Purification for the City of Chicago.

Mr. Vaughn.

STATEMENT OF JAMES C. VAUGHN
ENGINEER OF WATER PURIFICATION
CITY OF CHICAGO

MR. VAUGHN: Mr. Chairman, Conferees, ladies and gentlemen.

Since this report today is essentially a supplement of the 1965 Chicago report, I would like to submit for inclusion in the record a copy of the Department magazine, Pure Water, Volume XVII, Number 1, 1965, which includes statements by Mayor Daley, Commissioner Jardine, and a slight condensation of the report rendered by Mr. Gerstein at the March 1965 Conference. I have five extra copies of this, if anyone desires them.

MR. STEIN: May I see one of those, sir?

MR. VAUGHN: That is the '65 report.

MR. STEIN: This, without objection, will be included as an exhibit.

(Which said document, entitled "Pure Water, Volume XVII, Number 1, 1965" is marked as Conference Exhibit No. 7, 2/5/68, and is on file at the Federal Water Pollution Control Administration offices in Washington, D. C., with a copy on file at the Regional Office of the FWPCA in Chicago, Illinois.)

MR. VAUGHN: This is a statement on the effect of water quality deterioration at the southern end of Lake Michigan on the operation of Chicago's south water filtration plant. The title on the bound copies that have been distributed is a little more concise.

At the Conference held by the Federal Water Pollution Control Administration in Chicago on March 2-9, 1965, Mr. H. H. Gerstein, then Chief Water Engineer, presented a statement in behalf of the Department of Water and Sewers. This report reviewed 20 years of surveys of the Bureau of Water at the southern end of Lake Michigan and its tributaries showing how there had been a steady and marked increase in the degree of pollution of these waters. Several of the tables and charts used in this report have been updated and will be a part of our report today.

Also, at the recent Conference held by the FWPCA on September 11, 1967, the Engineer of Water Purification made a report on the continued deterioration of water quality at the southern end of Lake Michigan.

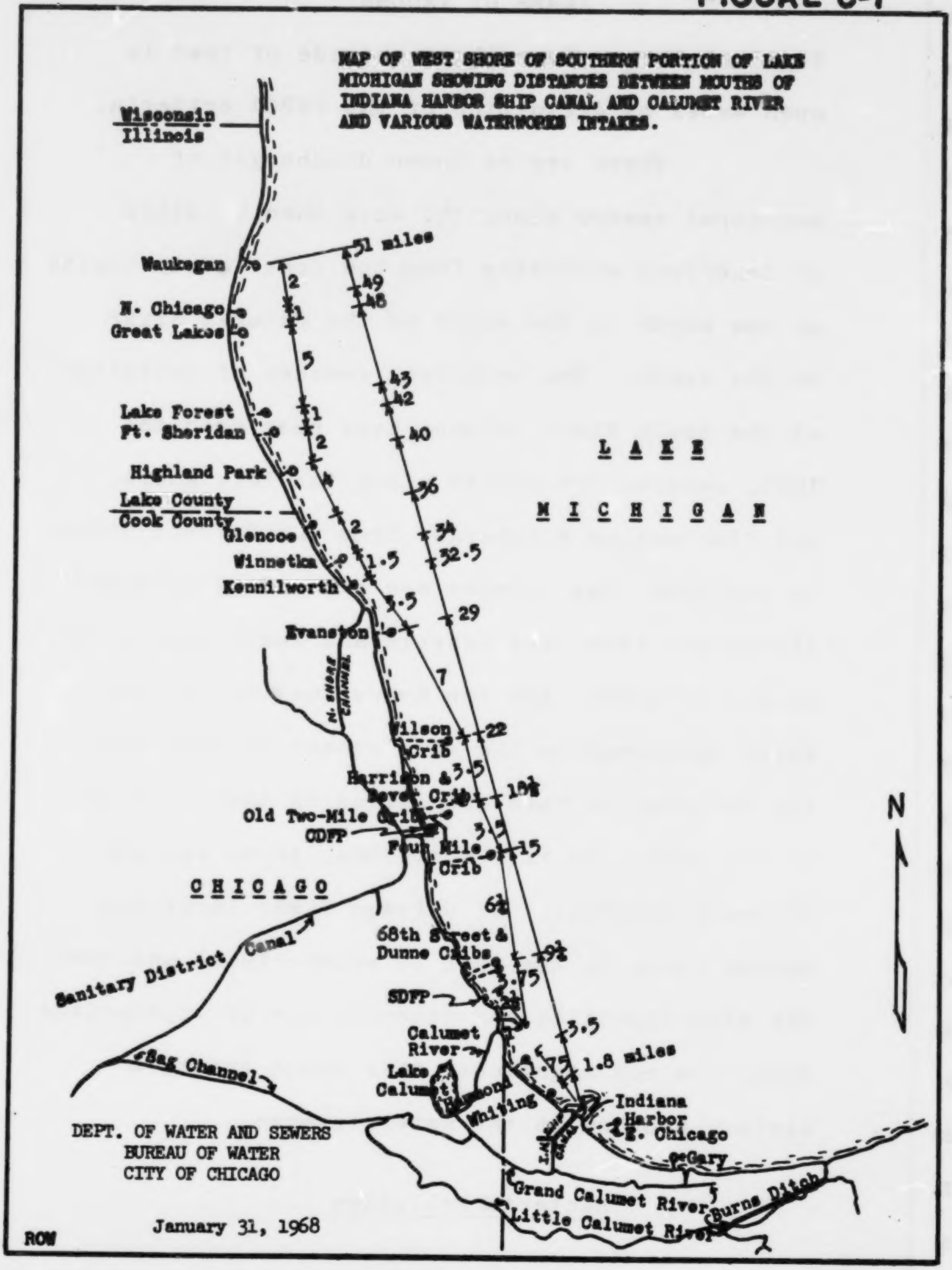
It is the intent of this report to combine the stories of both of these former reports and bring the information and data up through the end of 1967. In addition to describing the increase in levels of certain water quality parameters, this report will delineate the effect of pollution on the costs of water treatment.

Since the criteria proposed in the 1965 report were expanded and established as official criteria by the FWPCA Conference of January 4-6, 1966, when the Chicago South Water Filtration Plant was established as one of the two control points (the other being the Gary-West intake of the Gary-Hobart Water Corporation) for the open waters of Lake Michigan, the considerations of this report will be limited to the situation at the South Plant. To refresh your memories as to the layout of the South Plant, it is located on "made" land at the foot of 79th Street in Lake Michigan. The expansion of this plant to 480 mg/day rated capacity and 850 mg/day peak capacity has been completed. There are two sources of water supply. One is from the Dunne Crib two miles off 68th Street. This crib is connected to the filtration plant through a 14- and 16-foot tunnel. The plant also has a shore intake at the east end which is located in about 24 feet of water and is used as an alternate or joint intake. Since both intakes are frequently used at the same time, the official samples as established in the FWPCA criteria are those taken from the raw water header which represents a variable mixture of both crib and shore water. All data in this report are taken from tests on raw water header samples.

Figure C-1 is a map showing the location of Chicago's two filter plants and the crib intakes, and also shows distances that the various intakes along the lake are from the pollution sources at the mouth of the Indiana Harbor Ship Canal (IHSC) and the mouth of the Calumet River. For example, the Dunne intake is approximately 3-3/4 miles from the mouth of the Calumet River and 9-1/4 miles from the mouth of the IHSC; the Dever intake is 18-1/2 miles and the Wilson intake, which is now closed down, not in use, is 22 miles north of the mouth of the ship canal.

At this point it would seem desirable to define open waters. The open waters are all of Lake Michigan outside of a line drawn from the Calumet Harbor breakwater past the Inland Steel breakwater into the intake of the U. S.

FIGURE C-1



MAP OF WEST SHORE OF SOUTHERN PORTION OF LAKE MICHIGAN SHOWING DISTANCES BETWEEN MOUTHS OF INDIANA HARBOR SHIP CANAL AND CALUMET RIVER AND VARIOUS WATERWORKS INTAKES.

Wisconsin
Illinois
Waukegan
51 miles
2
49
48
1
N. Chicago
Great Lakes
5
43
42
Lake Forest
Ft. Sheridan
1
2
40
Highland Park
4
36
Lake County
Cook County
Glencoe
2
34
Winnetka
1.5
32.5
Kenilworth
3.5
29
Evanston
7
N. SHORE CHANNEL
Wilson Crib
22
Harrison & Dever Crib
3.5
18½
Old Two-Mile Crib
CDFP
Four Mile Crib
3.5
15
6½
68th Street & Dunne Cribs
9½
3.75
SDFP
Calumet River
3.5
1.75
1.8 miles
Lake Calumet
Hammond
Whiting
Indiana Harbor
E. Chicago
Gary
Indiana Harbor Canal
Grand Calumet River
Little Calumet River
Burns Ditch
Sag Channel
Sanitary District Canal
CHICAGO
L A K E
M I C H I G A N
N
ROW

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Steel at Gary. Everything outside of that is open water by definition of the FWPCA criteria.

There are no known discharges of municipal sewage along the more than 30 miles of lakefront extending from the Cook County limits on the north to the mouth of the Calumet River on the south. The principal sources of pollution at the South Plant intakes have been from the IHSC, several industries along the lake shore, and fluctuating discharges from the Calumet River. In addition, the intakes are exposed to illegal discharges from lake vessels and small craft. Of recent interest. are the heavy fuel oil slicks which developed in the late summer of 1967 and are believed to have originated in the vicinity of the IHSC. On rare occasions, after periods of heavy rainfall, the Chicago River locks are opened (once in the last 10 years--1961) and when the wind direction and velocity are of appropriate direction and magnitude, this could create a serious problem at the water intakes.

Bacterial Pollution

The results of bacteriological

examination of samples of raw water collected daily from the SWFP intakes over the last 17 years, are summarized in Table D-1 and plotted on Chart D-1 which are shown together in the figure. It is interesting to note that there was a significant drop in 1965 and 1966 in the overall average confirmed coliform organisms per 100 ml. However, in 1967, there was a serious rise and the average was higher than it has been at any one time in the last 17 years, the annual average value being 260 coliform organisms per 100 ml. It is also interesting to note that the highest maximum day in the 17-year period occurred in 1967 with a maximum value of 13,000 coliform organisms per 100 ml.

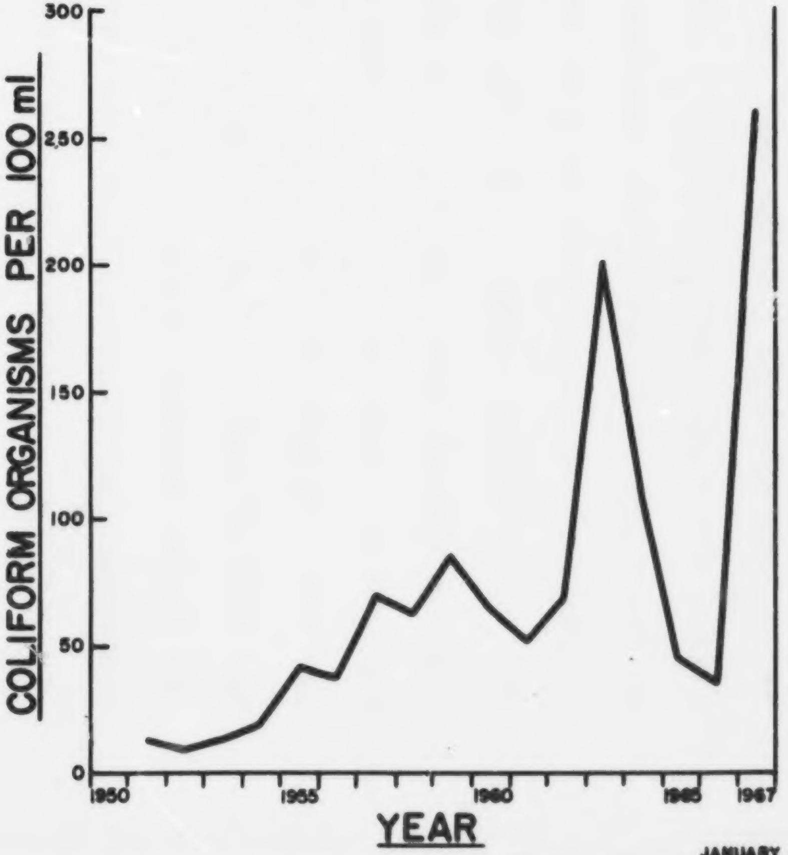
Abnormal Pollution at the SWFP Intakes

The greatest pollution problems occur when slugs of industrial waste drifting around the lake have abnormal hydrocarbon odors which are similar to those which are obtained by diluting oil refinery wastes with lake water. Usually, the water during these periods has an unusually high ammonia nitrogen and phenol content

FIGURE D-1

AVERAGE COLIFORM PER 100 ml SOUTH WATER FILTRATION PLANT INTAKE 1950 - 1967

YEAR	COLIFORM PER 100 ml	
	ANNUAL AVERAGE	MAXIMUM DAY
1950		
1951	14.0	375
1952	9.7	495
1953	13.9	534
1954	20.0	959
1955	42.3	1300
1956	38.7	1400
1957	70.8	9600
1958	63.1	6400
1959	85.6	3200
1960	65.2	2900
1961	52.4	3000
1962	69.5	1700
1963	200.8	5800
1964	110.2	1900
1965	46.3	1100
1966	35.8	1200
1967	260.0	13000



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and has abnormal chlorine absorption properties. All of which increase the difficulty and the cost of producing satisfactory finished water. The data on abnormal oil refinery wastes odor periods for the past 18 years is tabulated in Table D-2 and plotted on Figure D-2. Shown in both the table and on the chart are the number of odor periods each year and the total odor days each year. Shown in the table are the maximum threshold odor ranges during the odor periods and the maximum activated carbon dosage applied in lbs/mg. It is noted that the number of odor days in 1965 were 46; in 1966, 95; and in 1967, 89. The maximum carbon dosages in lbs/mg were 320 lbs/mg in 1965; 385 in 1966; and 557 in 1967. This indicates that during these years tne problem is certainly becoming more serious.

At this time, it is proper to remind ourselves that a water treatment plant must be prepared to treat the maximum demands that will be placed upon it as to quantity and quality; otherwise, an unsatisfactory water supply will frequently be delivered to the consumer.

In 1965, we reported the maximum ammonia

TABLE D-2
SUMMARY OF "OIL REFINERY WASTE" TYPE ABNORMAL ODOR PERIODS IN RAW LAKE WATER SUPPLY TO SOUTH WATER FILTRATION PLANT
1950-1967

Year	Number of Odor Periods	Total Odor Days	Maximum Threshold Odors During Periods			Maximum Activated Carbon Dosage Applied #/MG
			4-20	21-50	51-100	
1950	10	36	6	3	1	1,158
1951	20	127	16	4	-	446
1952	17	30	16	1	-	590
1953	16	18	16	-	-	266
1954	12	23	11	1	-	356
1955	15	36	15	-	-	279
1956	13	28	12	1	-	415
1957	18	49	18	-	-	325
1958	17	43	16	1	-	503
1959	19	40	17	2	-	712
1960	21	42	20	1	-	324
1961	23	94	23	-	-	388
1962	23	76	23	-	-	370
1963	28	72	27	1	-	680
1964	28	89	27	-	1	745
1965	15	46	14	1	-	320
1966	26	95	25	1	-	385
1967	21	89	20	1	-	557

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City of Chicago

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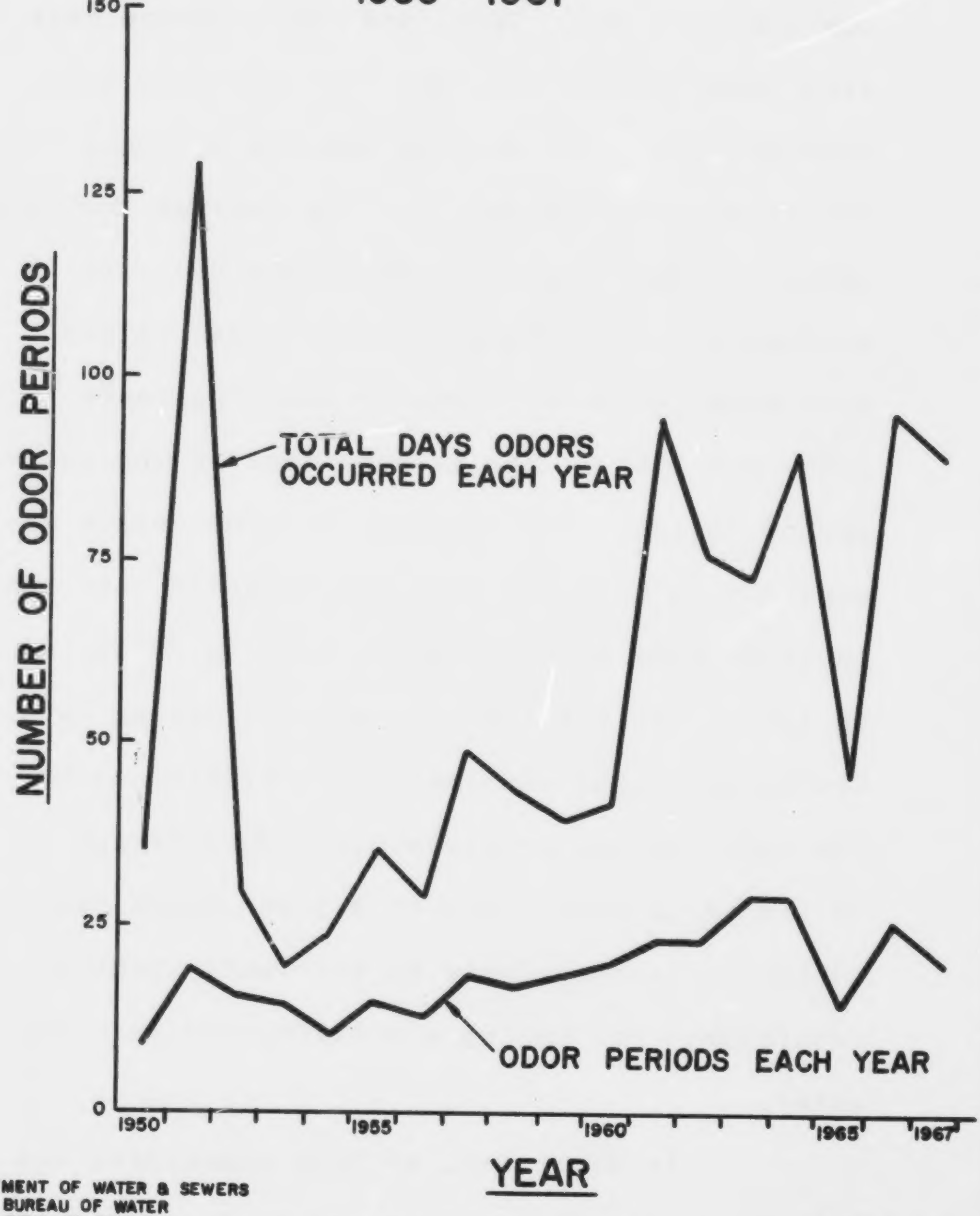
FIGURE D-2

ABNORMAL "OIL REFINERY" TYPE ODOR PERIODS

SOUTH WATER FILTRATION PLANT INTAKE 1950 - 1967



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nitrogen (ppm), the maximum activated carbon dosage (lbs/mg), and the maximum chlorine dosage (lbs/mg) through 1964 on Table D-3. We have now included 1965, 1966, and 1967. These data were taken during abnormal "oil refinery type" odor periods. The maximum ammonia nitrogen values are plotted on Figure D-3. The maximum activated carbon dosage is plotted on Figure D-4. It is pointed out that the ammonia nitrogen values have shown a steady increase over the years 1965, 1966, and 1967. This is also true of the activated carbon dosage. The maximum chlorine dosage was constant in 1965 and 1966 but showed a very sharp increase from 53.9 lbs/mg in 1966 to 70 lbs/mg in 1967. The maximum dosage of 70 lbs/mg is 50 lbs/mg more than what may be considered to be the basic normal requirements. This dosage of 70 lbs/mg is equivalent to 9.3 ppm which can certainly be considered an extremely abnormal requirement for making a satisfactory drinking water.

In Table D-4, we have summarized the total activated carbon applied in lbs. per year. The average carbon dosage in lbs/mg and the

TABLE D-3

SUMMARY OF MAXIMUM AMMONIA NITROGEN IN INTAKE WATER SUPPLY, AND ACTIVATED CARBON AND CHLORINE APPLIED DURING ABNORMAL ODOR POLLUTION PERIODS SOUTH WATER FILTRATION PLANT, 1950-1967

Year	Maximum Ammonia Nitrogen (ppm)	Maximum Activated Carbon Dosage (lb/milgal)	Maximum Chlorine Dosage (lb/milgal)
1950	0.276	1,158	84.0
1951	0.196	446	45.5
1952	0.248	590	45.1
1953	0.120	266	35.4
1954	0.148	356	20.8
1955	0.125	279	24.3
1956	0.180	415	24.4
1957	0.248	325	26.8
1958	0.680	503	19.4
1959	0.290	712	24.5
1960	0.272	324	16.0
1961	0.358	388	20.3
1962	0.590	370	27.2
1963	0.230	680	42.8
1964	0.496	745	56.1
1965	0.198	320	53.1
1966	0.260	385	53.9
1967	0.380	557	70.0

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FIGURE D-3

MAXIMUM AMMONIA NITROGEN DURING ABNORMAL "OIL REFINERY" TYPE ODOR PERIODS

SOUTH WATER FILTRATION PLANT INTAKE
1950 – 1967

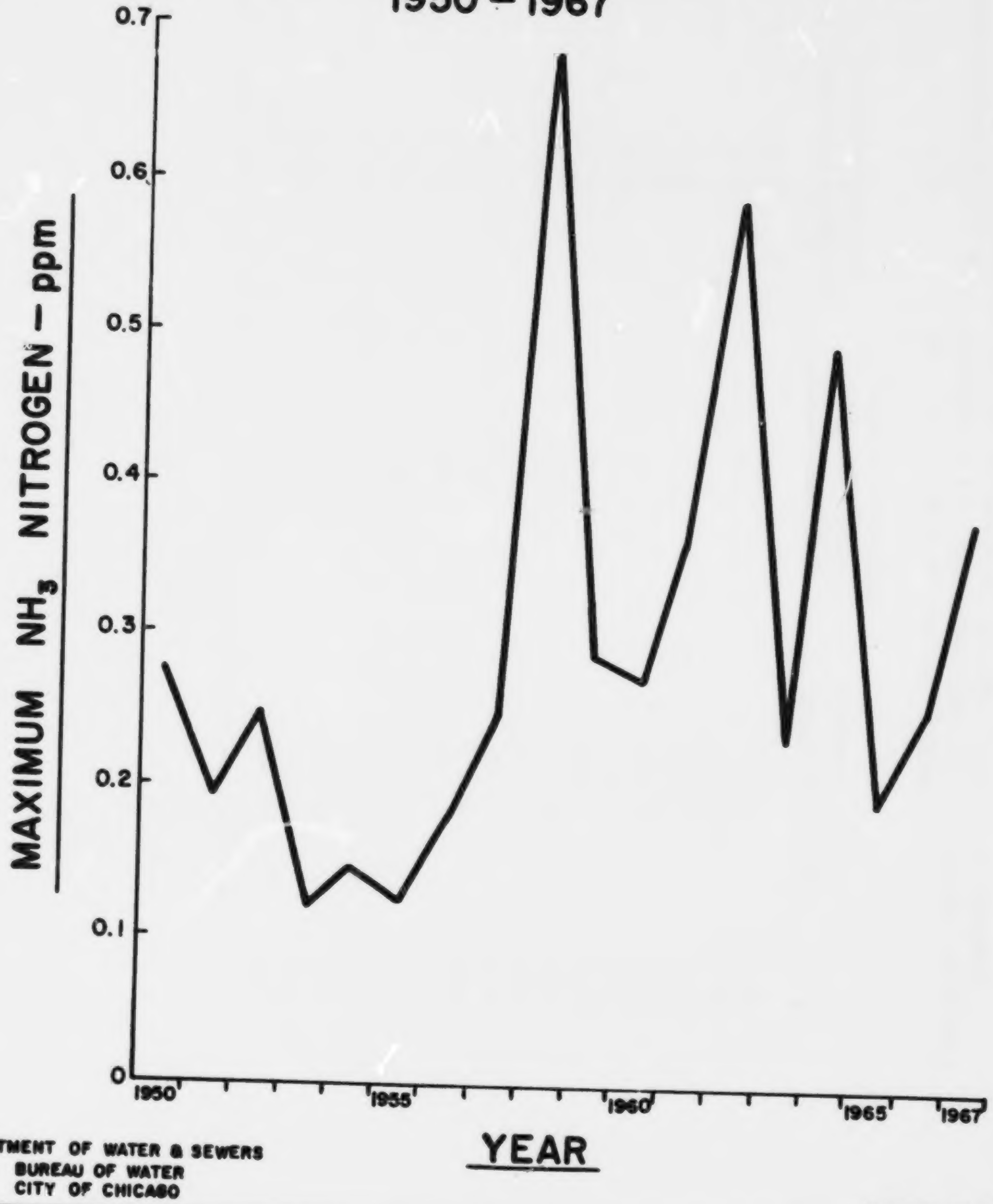

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Table D-4

SUMMARY OF ACTIVATED CARBON APPLIED FOR REMOVAL OF ODORS IN LAKE WATER
SOUTH WATER FILTRATION PLANT
1950-1967

Year	Total Activated Carbon Applied (lbs)	Average Carbon Dosage (lb/milgal)	Maximum Hourly Carbon Dosage during Odor Periods (lb/milgal)
1950	2,874,905	25.5	1,158
1951	3,545,552	30.7	446
1952	3,203,426	26.3	590
1953	1,775,063	13.9	266
1954	2,011,359	15.7	356
1955	2,057,781	16.6	279
1956	1,981,108	16.0	415
1957	3,032,729	24.0	325
1958	2,762,540	22.0	503
1959	3,035,509	23.0	712
1960	2,727,005	20.7	324
1961	2,632,923	20.6	388
1962	2,865,541	21.6	370
1963	3,194,443	22.8	680
1964	3,773,655	26.7	745
1965	3,094,606	23.0	320
1966	4,678,661	33.0	385
1967	4,449,432	32.0 *	557

* As reported on September 11 for the first 6 months of 1967, was 42 lbs/mil gal

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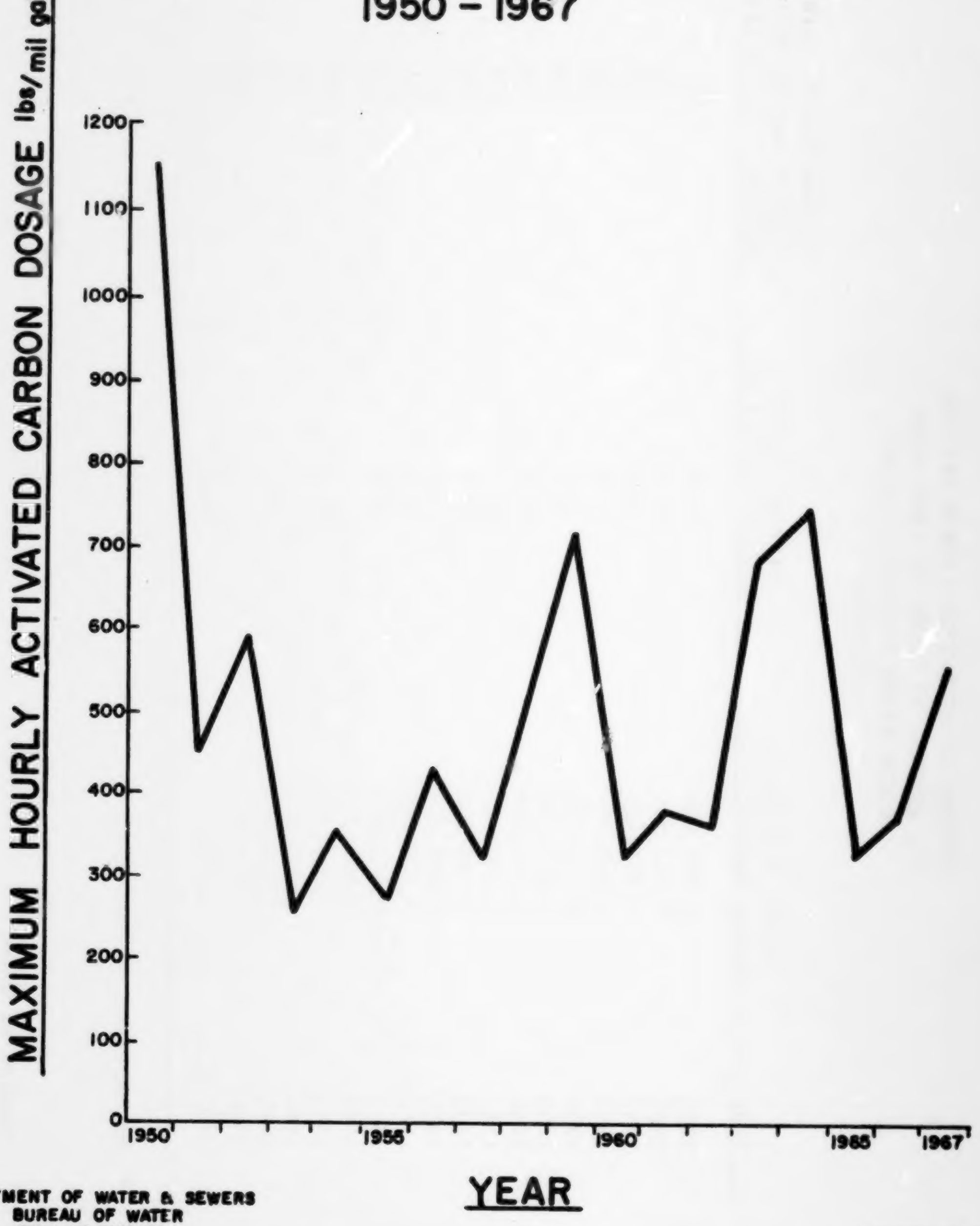
FIGURE D-4

MAXIMUM ACTIVATED CARBON
DOSAGE DURING ABNORMAL
"OIL REFINERY" TYPE ODOR PERIODS
SOUTH WATER FILTRATION PLANT INTAKE
1950 - 1967



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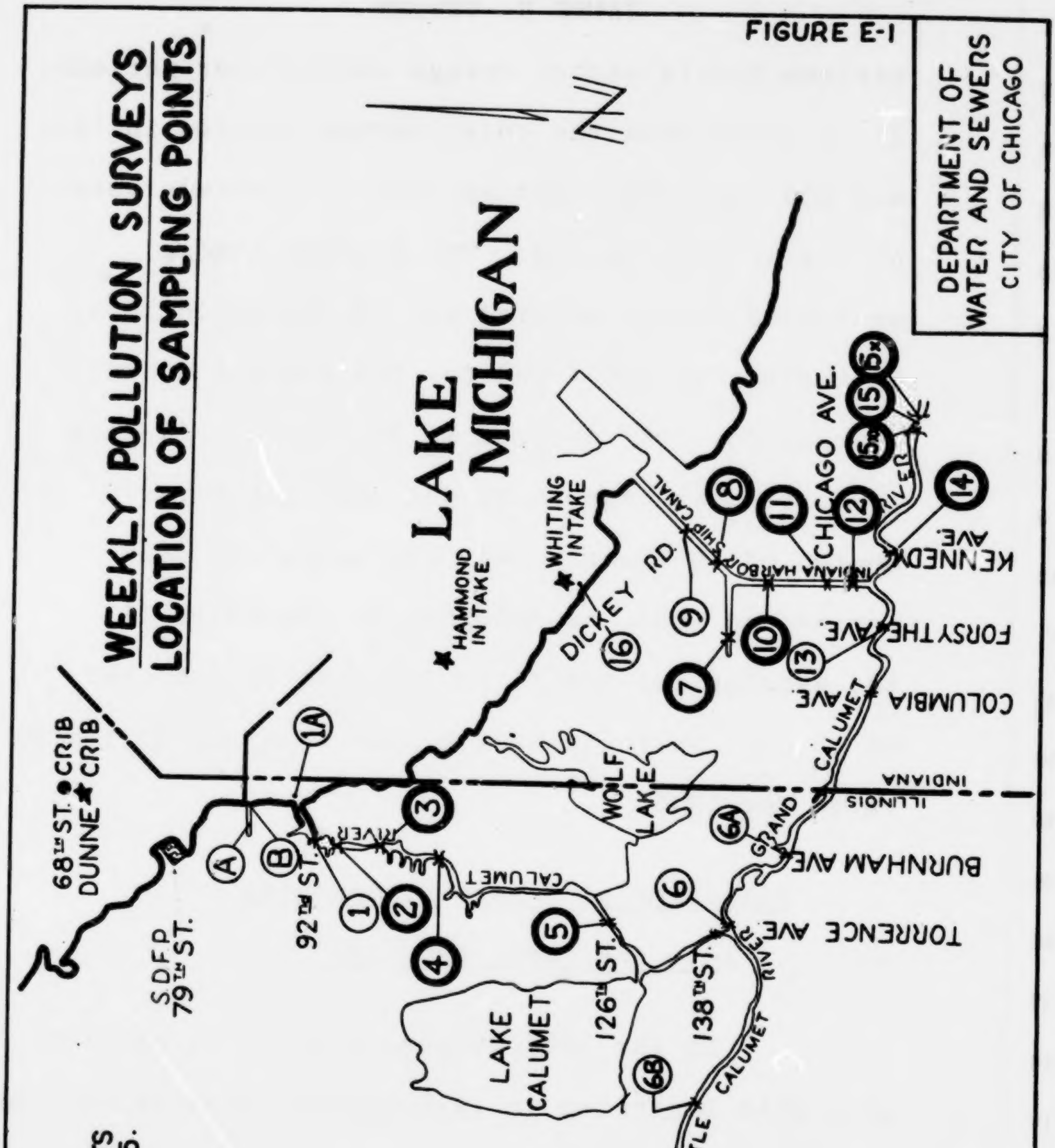
maximum hourly carbon dosage during odor periods. It is noted that the total carbon applied in 1966 and 1967 exceeded that applied in previous years of the 18-year period. The average lbs/mg activated carbon applied was 23 lbs/mg in 1965; 33 lbs/mg for 1966; and for the overall annual average for 1967 dropped to 32 lbs/mg. At this time, it must be pointed out that the first 6 months of 1967 was a very bad taste and odor period and that, as reported on September 11, the average for the first 6 months of 1967 was 42 lbs/mg, which is much higher than the 33 lbs/mg value for 1966.

Pollution of Rivers Discharging into the Lake, 1950-1967

In the 1965 Chicago Report, as pointed out, that beginning in 1948 samples were taken from a number of points on the Calumet River, the Grand Calumet River, the Little Calumet River and the Indiana Harbor Ship Canal. The locations of these sampling points are shown in Figure E-1. After the 1965 Conference, and more particularly the January 1966 Conference in which the criteria were



WEEKLY POLLUTION SURVEYS
LOCATION OF SAMPLING POINTS

FIGURE E-1

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N
LAKE MICHIGAN
HAMMOND INTAKE
WHITING INTAKE
68TH ST. CRIB
DUNNE CRIB
SDFP 79TH ST.
92ND ST.
A
B
1
1A
2
3
4
5
6
6A
6B
7
8
9
10
11
12
13
14
15N
15
15S
16
CALUMET RIVER
WOLF LAKE
LAKE CALUMET
126TH ST.
138TH ST.
TORRENCE AVE
BURNHAM AVE
GRAND CALUMET RIVER
COLUMBIA AVE.
FORSYTHE AVE.
KENNEDY AVE.
CHICAGO AVE.
DICKEY RD.
INDIANA HARBOR SHIP CANAL
INDIANA
ILLINOIS
LITTLE CALUMET RIVER
CAL-SAG CHANNEL
○ SAMPLING POINTS DROPPED IN 1965.

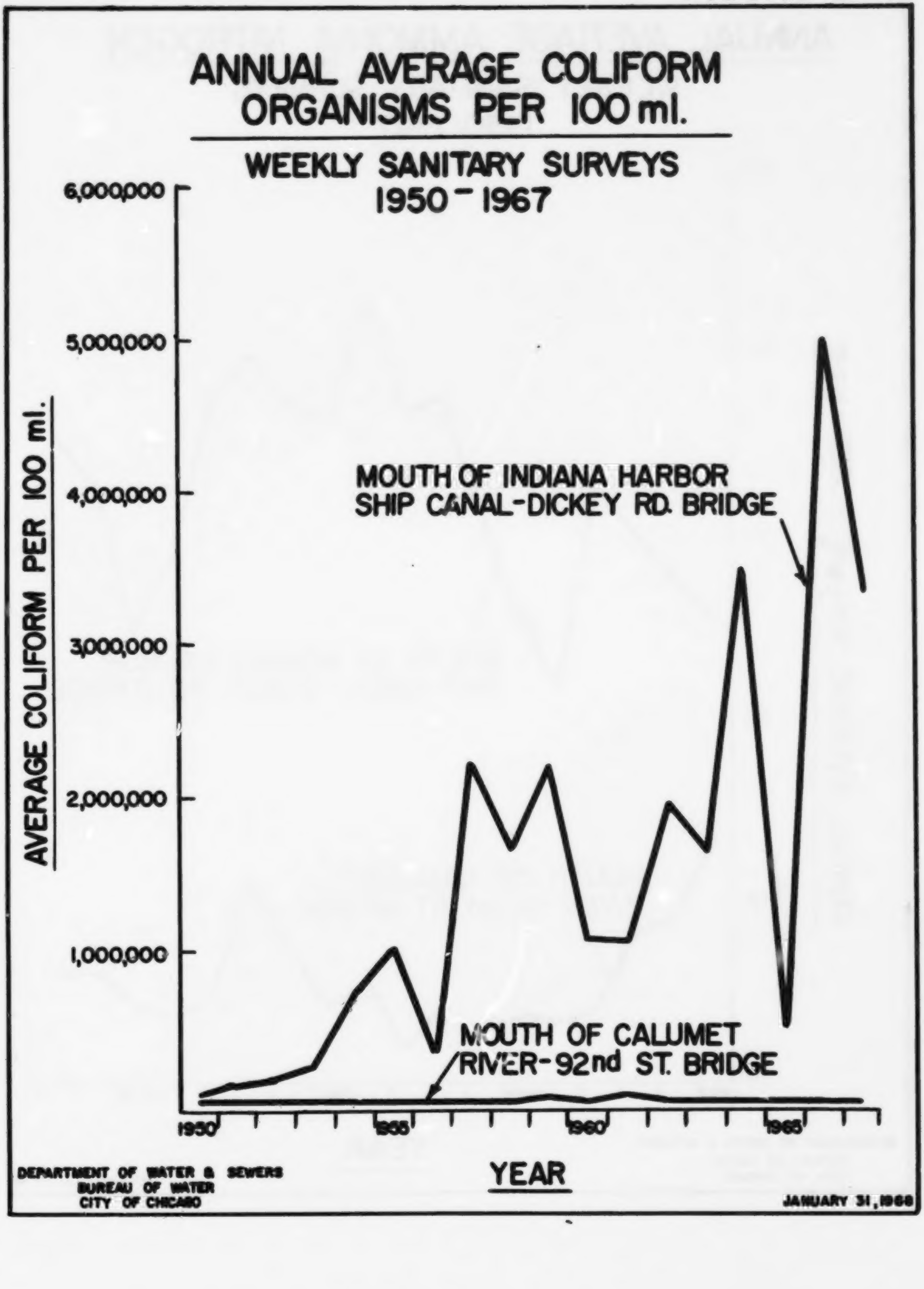
made official, a certain number of these points were abandoned in the weekly sampling schedule. It was decided at that time that we were more concerned with what went into the lake than in what happened in the interior of the Calumet Region. These points are indicated by the heavy rings around the sampling point number. The remainder of the points indicated by the light ring have continued to be sampled and the data from these analyses have been accumulated.

It has been assumed that we are more concerned with the contribution of pollutants to the water in the southern end of Lake Michigan by the IHSC and the Calumet River. For this reason we have maintained a more rigorous sampling schedule at the discharge points of these two tributaries. It is recognized that the flow from the Ship Canal amounts to 700-900 cubic feet per second while the discharge from the Calumet River is variable depending on the relative levels of the Calumet River and Lake Michigan at the point of the river discharge. This discharge is also affected by the amount of precipitation, and the wind direction and velocity.

The level of some principal pollutants added to Lake Michigan by the above-described two tributaries are plotted on Figures E-4, E-5, and E-6. In Figure E-4, the annual average coliform organisms per 100 ml are plotted for the IHSC at Dickey Road Bridge and the Calumet River at the 92nd Street Bridge. The level at the 92nd Street Bridge on the Calumet River has not been significant at any time in the 18 years and has not increased in the last several years. This is no doubt due to the fact that there is generally very little flow out of the Calumet River and also due to the fact that the Sanitary District now chlorinates the stormwater when it is necessary to pump to the river at 95th Street. The level of coliform organisms in the water of the Ship Canal at the Dickey Road Bridge increased in 1965 and 1966 but showed a marked drop in 1967. The Ship Canal is known to receive the effluents from the Gary, Hammond and East Chicago sewage plants, and during 1967 chlorination of the effluents was practiced for a good deal of the year at the Hammond and East Chicago plants.

In Figure E-5, the annual average ammonia

FIGURE E-4



ANNUAL AVERAGE COLIFORM ORGANISMS PER 100 ml.

WEEKLY SANITARY SURVEYS 1950 - 1967

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FIGURE E-5

ANNUAL AVERAGE AMMONIA NITROGEN

WEEKLY SANITARY SURVEYS

1950-1967

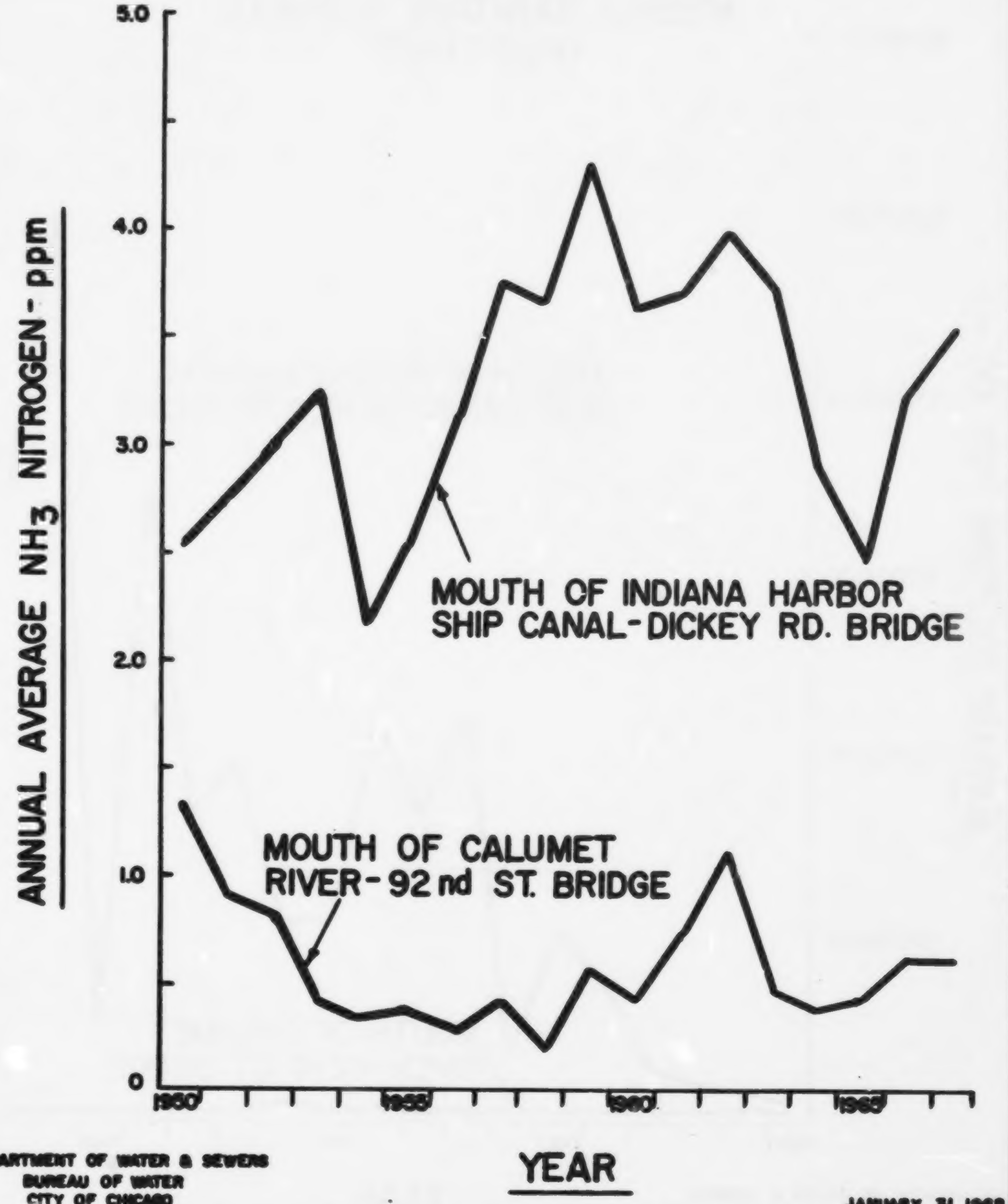

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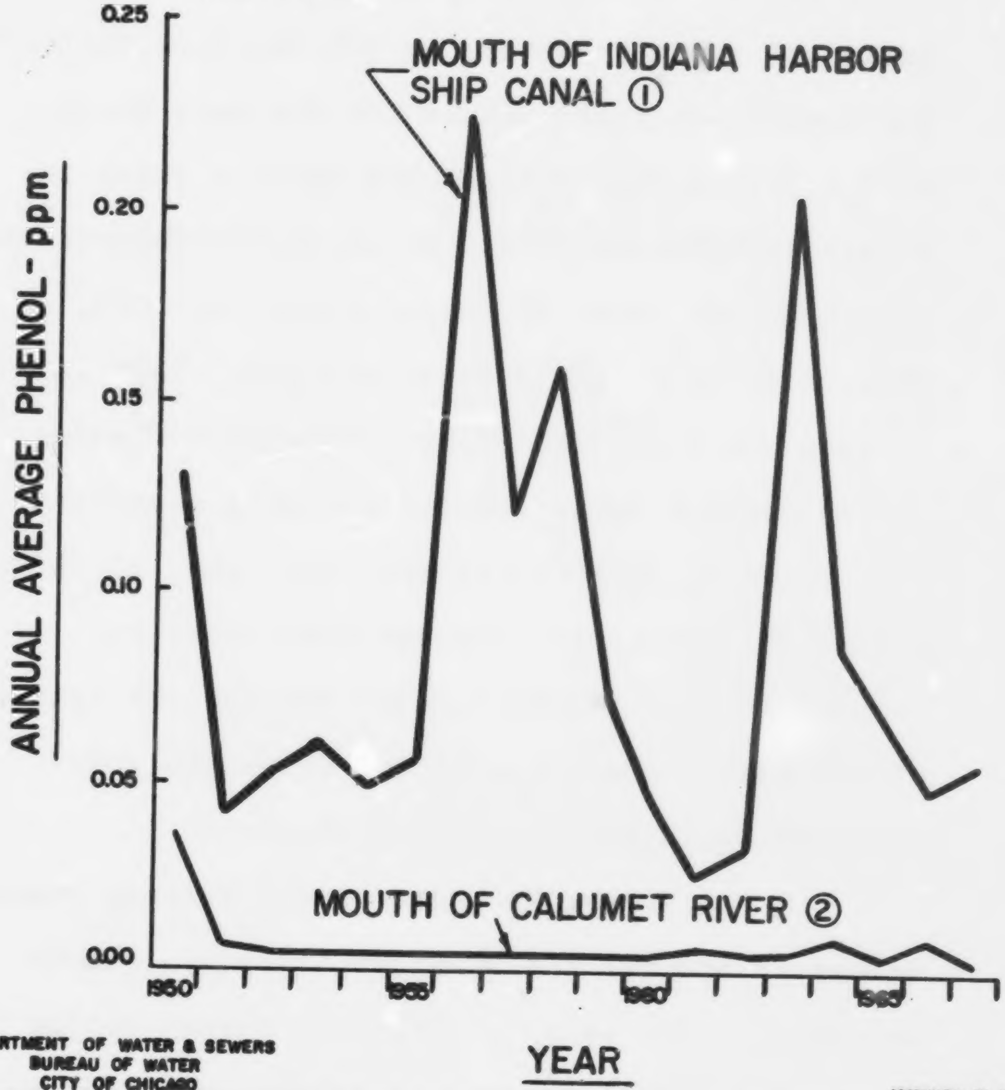
FIGURE E-6

ANNUAL AVERAGE PHENOL

WEEKLY SANITARY SURVEYS
1950-1967

① INDIANA HARBOR SHIP CANAL SAMPLING AT CANAL ST. BRIDGE (1950-1959) AND DICKEY RD. BRIDGE (1960-1967)

② CALUMET RIVER SAMPLING AT 92nd ST. BRIDGE (1950-1967)



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nitrogen values in ppm are plotted for the two points under discussion. In 1964, 1965, and 1966, the values at the 92nd Street Bridge of the Calumet River showed some increase but remained constant for 1967. This also was no doubt due to the oxidizing effect of the chlorination of the stormwater by the Sanitary District. The ammonia nitrogen values for the Ship Canal at the Dickey Road Bridge have shown a sharp increase in 1966 and 1967. Of particular significance is the actual level of these values for 1967. This value is slightly above 3.5 ppm. This is roughly ten times the value indicated by Sawyer in his Madison Lakes studies as being necessary for continual algal nuisances (his value is .3 ppm). If this water from the Ship Canal is diluted 10 to 1 by the time it reaches the intakes of the SWFP, it would still be above the level required for continuing algae nuisances.

In Figure E-6, the annual average phenol values in ppm for the same two tributary points are shown. The water at the 92nd Street Bridge of the Calumet River shows a slight drop from mid-1966 to 1967. This is again no doubt due to the oxidizing effect of the chlorination of storm-water overflow by the Sanitary District. The water from the Ship Canal at Dickey Road Bridge shows a slight increase for the year 1967. This indicates a higher level of pollution that tends to create problems at the SWFP.

Migration of Pollution Slugs

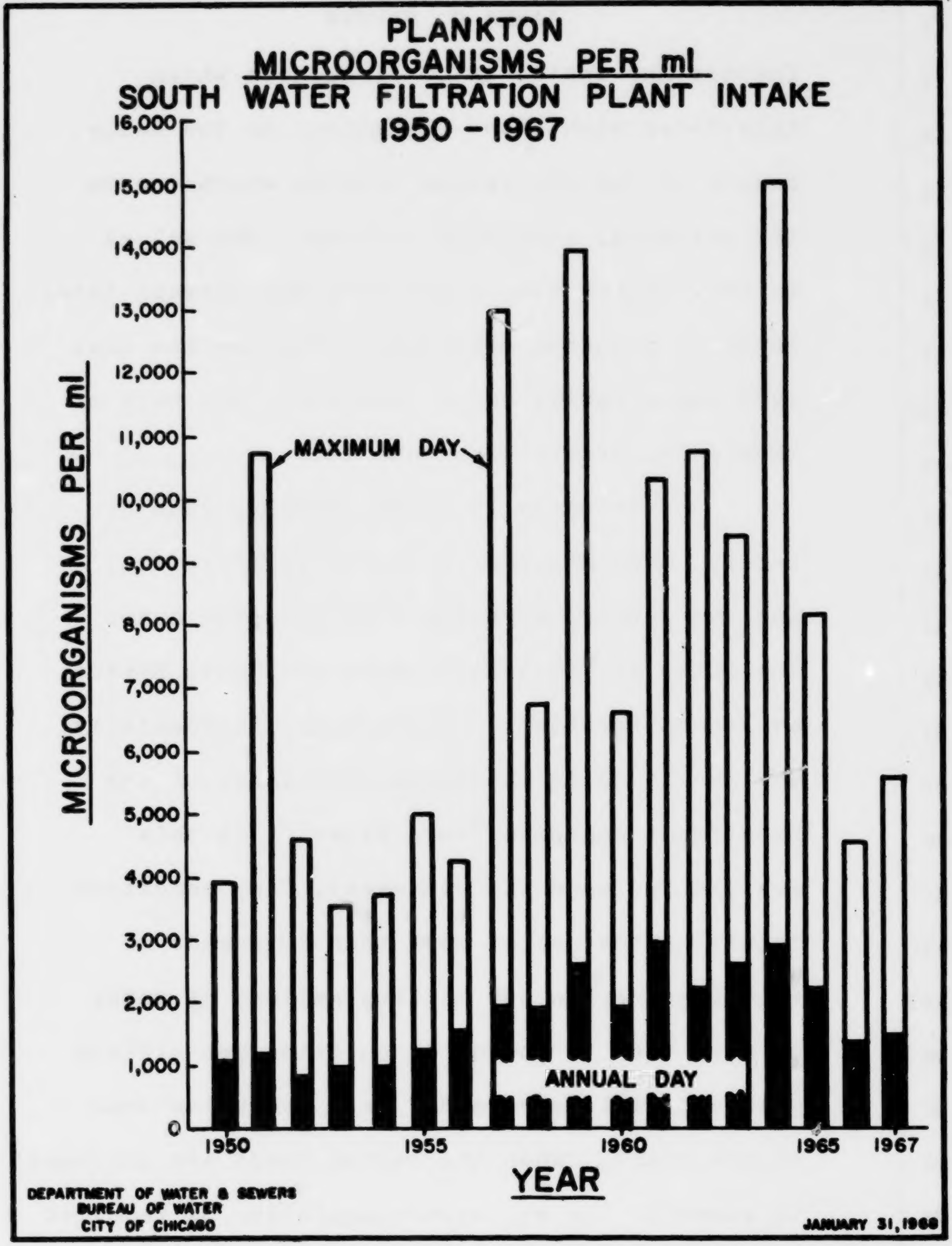
In the 1965 Chicago Report, considerable discussion was given to the migration of pollution slugs about the lake and to the SWFP intakes. Several case histories were cited giving the degree and severity of these pollution periods. It is recalled that one slug of pollution passed the SWFP crib intake four times, and on another and very unhappy occasion a slug passed the intakes several times, and on the last pass, the wind died down and this slug of pollution remained around the crib intake for several days. In the September 11, 1967 report, we again reported on the migration of slugs of hydrocarbon pollution from the SWFP intake area as far up the lake as the Central Water Filtration Plant (CWFP) shore intake. On another occasion an organic waste discharged into the lake from a point 20 miles north of Chicago migrated as far south as the CWFP intake. These incidents prove that the migration of slugs of pollution are an ever-present problem and that they can create periods of extreme difficulty in treating the water at the southern end of Lake Michigan. To paraphrase an old proverb, "Dilution is not the solution to pollution." I find that our wind vector analyses of these pollution slugs conforms very clearly to the current directions as reported by Dr. Baumgartner on Thursday.

Plankton Problems

Plankton, which is the general term for those micro-organisms in the lake water consisting principally of diatoms and algae, are a continuing problem. Sawyer, in his Madison Lakes work, indicated that if the ammonia nitrogen level is .3 ppm or higher, and the total phosphates level is .015 ppm or higher, that you can have continuing plankton nuisances. It used to be that at the SWFP, we had the spring and fall plankton peaks which gave some taste and odor problems, and interfered with the filter runs. However, in recent years we have acquired two additional general plankton problems. One is the occurrence of filamentous algae growth on the bottom of the lake, principally, the organisms cladophora. This organism reaches its maximum growth in late summer and wind--and we should add waves--action tares the material loose from the lake bottom and it collects on the screens of the intake basin, creating a major labor problem in cleaning the fixed screens at the South Plant for several months each summer, and for the past 12 years, we have had the incidents of two wintertime diatoms, Stephanodiscus hantzschii and Stephanodiscus binderanus. These organisms reach a peak growth when the water temperature is between 32 and 39° F. They are photosynthetic organisms and secrete carbon dioxide with the emission of oxygen. In the absence of free carbon dioxide of which there are only trace amounts in Lake Michigan water, they assimilate carbon dioxide from the calcium bicarbonate which results in the precipitation of colloidal calcium carbonate. This raises the pH of the water and creates colloidal turbidity which could require, and have, as much as a 100 percent increase in the normal coagulant dosage required. Three major incidents of these organisms occurred in December 1959, January 1961, and again in the beginning of 1967. Other plankton problems include the plugging of the screens by another filamentous algae known as dichotomosiphon. The filaments are about as long as the name. This has occurred in significant quantities at least three or four times in the last 30 years. Another plankton problem is the occurrence of an organisms known as dinobryon, known facetiously to our staff as the little Irishman Dinny O'Brien. This organism when present in significant numbers (30 or more per ml) gives the water a taste and odor characteristic of cod liver oil. This odor can be removed by super-chlorination or adsorbed by activated carbon. However, the dosages of each of these chemicals for this purpose have reached some very high quantities.

The number of plankton micro-organisms per ml as the annual average and the maximum days are plotted on Chart H-1. These values do not

FIGURE H-1



PLANKTON
MICROORGANISMS PER ml
SOUTH WATER FILTRATION PLANT INTAKE
1950 - 1967

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include the incidents of cladophora which interfered with plant operation, or the daily counts of the wintertime diatoms which create the colloidal turbidity problem. The values on this figure simply indicate the overall total count of plankton organisms. You can see that 1967 was slightly worse than 1966, but both of them considerably less than 1965.

In early 1953 the late Mr. John R. Baylis, then Engineer of Water Purification, and the author, prepared a joint paper under the title of "Pollution Loads and Their Effect on Plant Operation." This paper, incidentally, was published in the March 1953 issue of the Department magazine "Pure Water." In this article, we made the statement, "any condition requiring the use of more than 20 pounds of activated carbon per million gallons of water or more than 13 pounds of chlorine per million gallons, will be regarded as a pollution load on the plant. When the carbon feeds are increased to above 40 lbs mg, more coagulation is required to aid in the settling out of the carbon. After a study of plant operating data, it was concluded that except in periods of high turbidity, any coagulation dosage of over 90 lbs/mg may be charged to the carbon requirement, therefore, to the pollution load." After 14 years of continued experience in the operation of SWFP, this premise still appears to be sound.

In evaluating our operating experiences, we have developed a term "some maximum days of usage." By this is meant any day at the SWFP in which the total pounds of activated carbon feed amounted to 30,000 pounds or more was considered "a maximum day of usage." The number of days in which this occurred for each of the ten years 1958 through 1967, are listed in Table I-1 and plotted on Chart I-1. The total pounds of carbon feed each day, the average pounds per million gallons, and the maximum pounds per million gallons, are listed under the activated carbon heading. The maximum threshold odor hour of each of these days are listed under that heading and maximum ammonia nitrogen hours, is likewise listed under its heading. It is noted that the number of days of maximum usage was at a minimum in 1961, increased through 1964, and decreased

TABLE I-1

SOME MAXIMUM DAYS OF USAGE

1958 - 1967

Yr., Mo., and Day	Activated Carbon			Threshold Odors Maximum Hour	Ammonia Nitrogen Max. Hr. (ppm)
	Total #	Avg. #/MG	Max. #/MG		
1958					
April 3	40,250	119	320	16 Ch	.680
Nov. 18	47,893	140	204	7 Ch	.168
Nov. 19	43,029	125	213	7 Ch	.130
Dec. 27	69,500	223	485	14 Ch	.080
Dec. 28	34,624	115	262	8 Ch	.014
Dec. 29	87,550	258	503	30 Ch	.026
1959					
Jan. 9	94,353	276	466	16 Ch	.086
Jan. 10	87,351	275	548	30 Ch	.106
Jan. 11	111,747	367	712	50 Ch	.120
Jan. 13	46,315	137	252	25 Ch	.113
May 12	30,043	76	116	4 DMC	.058
May 26	33,378	91	138	5 DMC	.050
Oct. 23	36,044	101	162	12 Ch	.038
Oct. 24	35,785	112	137	10 Ch	.046
Dec. 28	31,655	156	256	14 Ch	.140
Dec. 29	30,006	91	214	9 Ch	.108
1960					
Jan. 12	31,739	97	144	5 Ch	.074
Feb. 16	38,525	118	324	35 Ch	.198
April 3	30,500	101	203	10 Ch	.150
Oct. 30	34,013	103	310	15 Ch	.272
Nov. 16	32,871	98	277	9 Ch	.168
Dec. 5	35,458	100	155	9 Ch	.130
Dec. 6	35,760	103	135	6 DMC	.232
1961					
Mar. 27	34,842	107	398	35 Ch	.152
Nov. 13	40,971	124	168	5 Ch	.160
Dec. 4	65,375	190	451	20 Ch	.350
Dec. 23	41,611	137	360	14 Ch	.220
1962					
Jan. 13	46,953	146	360	16 Ch	.174
Jan. 14	34,935	116	242	15 Ch	.318
Jan. 15	62,310	192	390	16 Ch	.242
Feb. 13	52,548	163	250	12 Ch	.138
April 1	48,038	161	363	20 Ch	.590
May 14	43,190	118	279	5 Ch	.084

TABLE I-1 (cont.)

SOME MAXIMUM DAYS OF USAGE

1958 - 1967

Yr., Mo., and Day	Activated Carbon			Threshold Odors Maximum Hour	Ammonia Nitrogen
	Total #	Avg. #/MG	Max. #/MG		Max. Hr. (ppm)
1963					
Jan. 25	53,091	156	316	14 Ch	.148
Jan. 26	54,171	154	313	14 Ch	.154
Jan. 27	30,399	95	157	12 Ch	.082
Jan. 29	57,322	162	470	9 Ch	.230
Jan. 30	76,307	211	665	8 Ch	.220
Feb. 1	91,658	252	680	30 Ch	.174
Feb. 2	53,037	153	283	10 Ch	.170
Feb. 3	75,824	231	333	14 Ch	.210
Mar. 4	40,950	117	266	12 Ch	.053
April 3	51,001	143	208	14 Ch	.140
April 4	38,257	108	230	9 Ch	.110
April 29	38,259	98	115	5 Ch	.118
1964					
Jan. 19	53,756	103	204	6 Ch	.100
Jan. 20	47,759	137	250	8 Ch	.158
Jan. 21	48,767	139	175	8 Ch	.164
Jan. 22	59,114	168	258	12 Ch	.146
Jan. 24	31,085	88	111	4 Ch	.112
Jan. 25	40,205	120	204	10 Ch	.130
Mar. 4	32,302	92	104	5 DMCh	.032
April 13	38,552	113	143	6 Ch	.250
May 5	40,096	103	146	6 DMCh	.082
July 19	37,163	95	115	4 DMS	.016
July 20	35,471	76	110	4 DME	.016
July 21	37,668	82	145	4 DM	.016
July 22	32,432	66	114	4 DM	.014
Aug. 2	30,486	59	97	4 DMCh	.072
Sept. 19	34,696	91	153	4 C	.106
Nov. 3	33,137	89	180	10 Ch	.128
Dec. 11	51,819	149	366	18 Ch	.156
Dec. 12	120,910	361	745	55 Ch	.150
Dec. 14	39,606	114	262	12 Ch	.082
1965					
Jan. 16	32,956	96	230	12 Ch	.198
Jan. 18	44,840	129	191	25 Ch	.144
Feb. 6	32,679	92	223	10 MCh	.128
Feb. 7	76,704	230	320	16 Ch	.138
Feb. 8	41,746	119	326	8 Ch	.110
Feb. 10	41,029	119	195	8 Ch	.117
Dec. 31	30,338	91	113	5 DMCh	.096

TABLE I-1 (Cont.)

SOME MAXIMUM DAYS OF USAGE

1958 - 1967

Yr., Mo., and Day	Activated Carbon Total #	Activated Carbon Avg. #/MG	Activated Carbon Max. #/MG	Threshold Odors Maximum Hour	Ammonia Nitrogen Max. Hr. (ppm)
1966					
Jan. 1	33,131	104	181	6 DMCh	.098
Jan. 2	50,033	166	319	14 Ch	.164
Jan. 3	57,299	169	310	8 Ch	.120
Jan. 4	69,166	185	258	9 Ch	.110
Jan. 5	48,006	140	196	8 Ch	.134
Jan. 31	53,630	150	260	7 DMCh	.122
Feb. 1	62,698	176	257	12 DMCh	.104
Feb. 2	41,643	115	154	6 DMCh	.080
Feb. 3	39,292	109	135	6 DMCh	.060
Feb. 7	43,452	122	162	6 DMCh	.106
Feb. 8	39,196	111	290	15 DMCh	.155
Feb. 9	116,649	328	385	18 DMCh	.204
Feb. 11	35,916	105	89	10 DMCh	.120
Feb. 17	59,904	171	370	12 DMCh	.160
Feb. 18	90,815	258	366	12 DMCh	.140
Feb. 19	45,517	140	272	13 DMCh	.146
Mar. 17	47,925	134	254	8 DMCh	.120
Mar. 18	50,231	145	220	12 DMCh	.168
Mar. 23	89,065	253	278	12 DMCh	.154
Mar. 24	30,269	87	149	5 DsMCh	.120
April 19	49,358	137	320	10 DMCh	.098
April 20	41,451	116	220	8 DMCh	.096
Aug. 15	33,187	72	119	10 Ch	.086
Oct. 15	45,998	127	200	9 DMCh	.094
Nov. 17	52,704	148	202	8 DMCh	.180
Nov. 18	30,784	86	146	4 DMCh	.134
Nov. 21	65,987	184	368	16 DMCh	.140
Nov. 22	40,484	113	296	10 DMCh	.158
Nov. 23	52,490	149	192	10 DMCh	.260
Dec. 6	45,209	123	283	6 DMCh	.062
1967					
Jan. 7	76,942	222	472	27 Ch	.224
Jan. 8	72,332	225	393	23 Ch	.152
Jan. 9	96,314	267	474	16 Ch	.150
Jan. 10	34,075	94	183	9 DMC	.196
Jan. 11	87,016	240	534	18 DMCh	.187
Jan. 12	43,356	127	339	8 DMCh	.164
Jan. 15	30,494	90	203	9 Ch	.166
Jan. 16	33,774	94	194	10 Ch	.180
Jan. 20	32,052	88	142	5 DMs	.124
Jan. 21	97.936	279	340	20 DCh	.376
Jan. 22	69,337	216	413	10 DsCh	.196
Jan. 23	30,031	69	192	9 DsMCh	.125

TABLE I-1 (Cont.)

SOME MAXIMUM DAYS OF USAGE
1958 - 1967

Yr.,Mo., and Day	Activated Carbon Total #	Activated Carbon Avg. #/MG	Activated Carbon Max. #/MG	Threshold Odors Maximum Hour	Ammonia Nitrogen Max. Hr. (ppm)
1967 (contd.)					
Mar. 11	35,536	106	385	7 DCh	.065
Mar. 25	41,501	120	350	9 DMCh	.118
Mar. 26	55,384	176	352	14 Ch	.124
Mar. 27	61,960	169	330	15 Ch	.124
Mar. 28	54,704	153	364	5 DMCh	.110
Mar. 30	38,095	105	307	15 Ch	.306
Mar. 31	60,111	169	280	8 DCh	.170
April 5	53,841	148	557	14 Ch	.380
April 7	36,438	104	285	12 Ch	.192
April 8	36,994	106	240	7 M	.196
April 9	51,965	158	414	15 Ch	.300
April 10	31,218	90	193	6 C	.280
Oct. 15	32,691	95	158	7 Ch	.074
Oct. 24	54,185	144	231	8 Ch	.080
Oct. 30	33,866	92	294	15 Ch	.124
Dec. 2	40,944	114	292	8 Ch	.096
Dec. 6	41,164	114	268	8 Ch	.120
Dec. 7	44,174	117	190	6 Ch	.100
Dec. 11	33,997	92	189	9 Ch	.092
Dec. 20	62,532	166	193	10 Ch	.140
Dec. 21	55,174	152	178	12 Ch	.160
Dec. 22	44,896	125	255	12 Ch	.100

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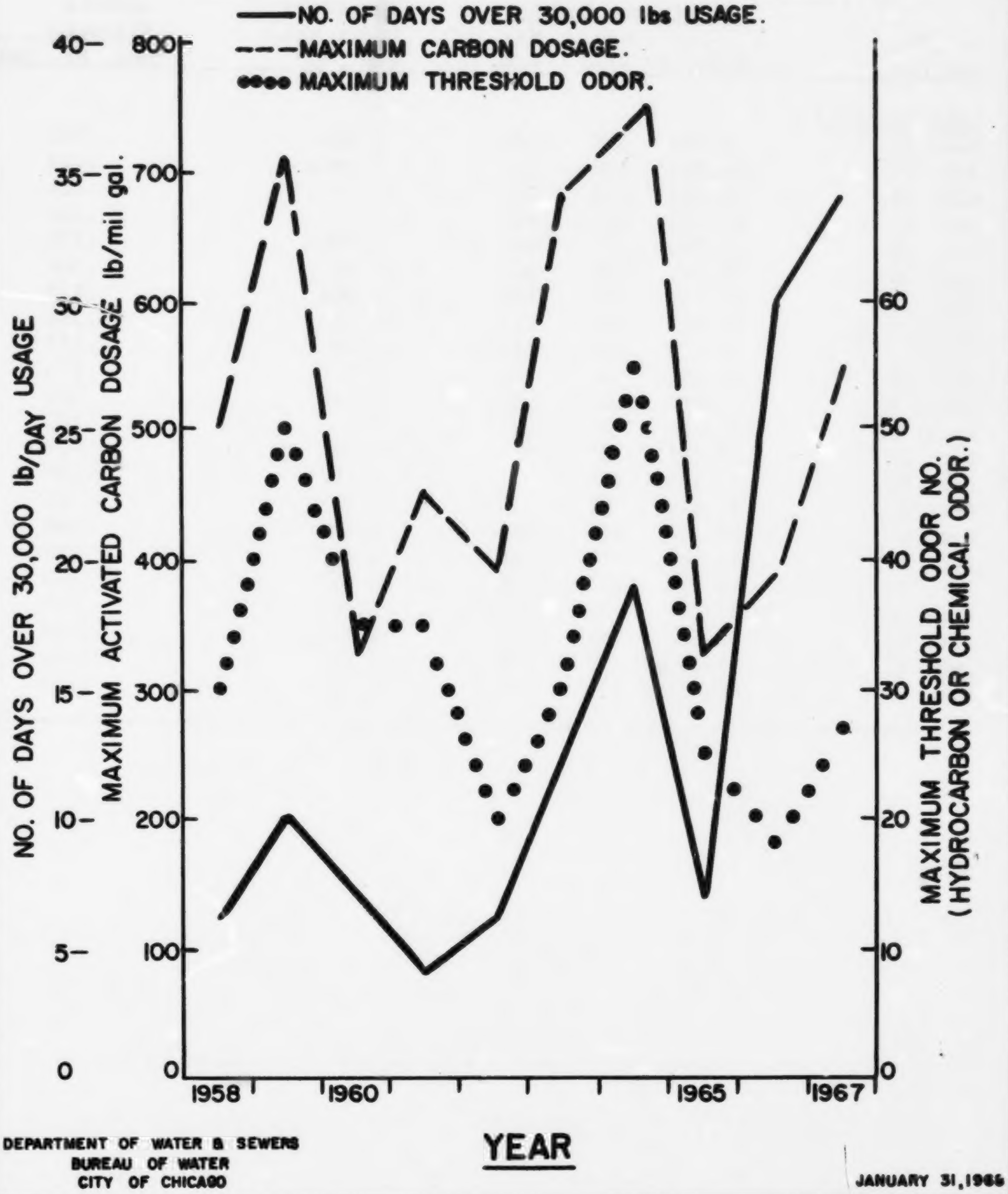
FIGURE I-1

MAXIMUM ACTIVATED CARBON USAGE
SOUTH WATER FILTRATION PLANT
1958-1967



DEPARTMENT OF WATER & SEWERS
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JANUARY 31, 1966

again in 1965. However, in 1966 and 1967, the number of days of maximum usage increased sharply. The first four months of 1967 were very bad with the next five months being months of moderate carbon usage. In October 1967, there were three days of maximum usage of carbon and in December there were seven days of maximum usage. It is noted that the maximum carbon dosage of 557 lbs/mg--that would be the dashed line--occurred on April 5, 1967. This indicates that the quality of water was much worse and required a much more severe treatment. It is pointed out also that the maximum threshold odor requiring this high treatment was somewhat lower numerically than the maximum threshold odor value in previous years. This confirms the conclusion that the quality of water was much worse requiring a much higher quantity of carbon for threshold odor reduction. In an overall examination of this chart, the lack of correlation between the peaks of maximum threshold odors and maximum carbon dosages in recent years, is still another indication that the quality of water is much worse and requires more extreme treatment. The total usage of activated carbon for the month of December 1967 was over 500,000 pounds. This, of itself, indicates that the degree of pollution remains extreme. If it were not for the development of the slurrying technique for feeding powdered activated carbon, the feeding of the amounts of carbon listed in the above-mentioned table would be impossible. As has been reported, powdered carbon is received in bulk and slurried into water at a concentration of one pound of carbon per gallon of slurry. This material is then fed from storage tanks through an appropriate metering device. However, the amount of slurry storage at the SWFP is still limited so that a reserve of 350,000 pounds of activated carbon in bag form is carried in reserve storage. During periods of extreme tastes and odors in the raw water, this bag carbon is dumped into slurrying tanks for use along with the regular slurried carbon. Usually from 30,000 to 60,000 pounds of this bag material is dumped each day during such periods. The disposal of the bags from this operation becomes a major task. Each 100 pounds of carbon represents three bags;

each 1,000 pounds, 30 bags; and 30,000 pounds means 900 bags. The disposal of this many bags is a sizable job.

Hopefully--that is for your attention, Conferees--if the hydrocarbon pollution at the southern end of the lake were materially reduced in the near future, our present slurry storage (500,000 pounds) might prove to be adequate. In Table I-2, we have listed the total consumption in lbs/mg of activated carbon, coagulants, and chlorine for each of the 10 years 1958 through 1967. This information is plotted on Chart I-2a, I-2b, and I-2c. This adds up to the rather amazing total of 33,206,564 pounds of activated carbon for the 10-year period. It is noted that the average for the entire year of 1967 (32 lbs/mg) is less than the average for 1966 (33 lbs/mg). However, it is recalled that previously we pointed out that the average carbon dosage for the first six months of 1967 was 43 lbs/mg. It is further noted that the coagulants dosages for the 10-year period have every year been well above the maximum level of 90 lbs/mg to which we previously referred. It is further

TABLE I-2

Annual Consumption of Activated Carbon, Coagulants (Alum, Ferrous Sulfate), and Chlorine
1958-1967

	Activated Carbon		Coagulants		Chlorine		Total Water Treated
Year	Total lb.	lb/milgal	Total lb.	lb/milgal	Total lb.	lb/milgal	(milgal)
1958	2,762,540	22	13,705,336	108	2,172,687	16.9	127,478.9
1959	3,035,509	23	14,259,529	108	1,982,719	14.9	131,988.6
1960	2,727,005	21	14,104,178	106	2,545,043	18.9	133,198.4
1961	2,632,923	21	16,088,039	126	2,461,640	19.3	127,603.5
1962	2,865,541	21	15,520,647	117	2,573,491	19.3	132,993.5
1963	3,194,443	23	16,509,311	118	2,898,487	20.7	139,993.5
1964	3,766,446	27	14,627,505	104	3,046,756	21.6	141,096.0
1965	3,094,606	23	14,279,870	104	2,797,986	20.4	136,894.8
1966	4,678,661	33	16,445,820	116	3,518,720	24.8	142,083.8
1967	4,448,890	32	15,778,872	112	3,437,485	24.4	141,106.9
Total	33,206,564	25*	151,319,107	112*	27,435,014	20.3*	1,354,437.9

* 10-year average

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Department of Water and Sewers
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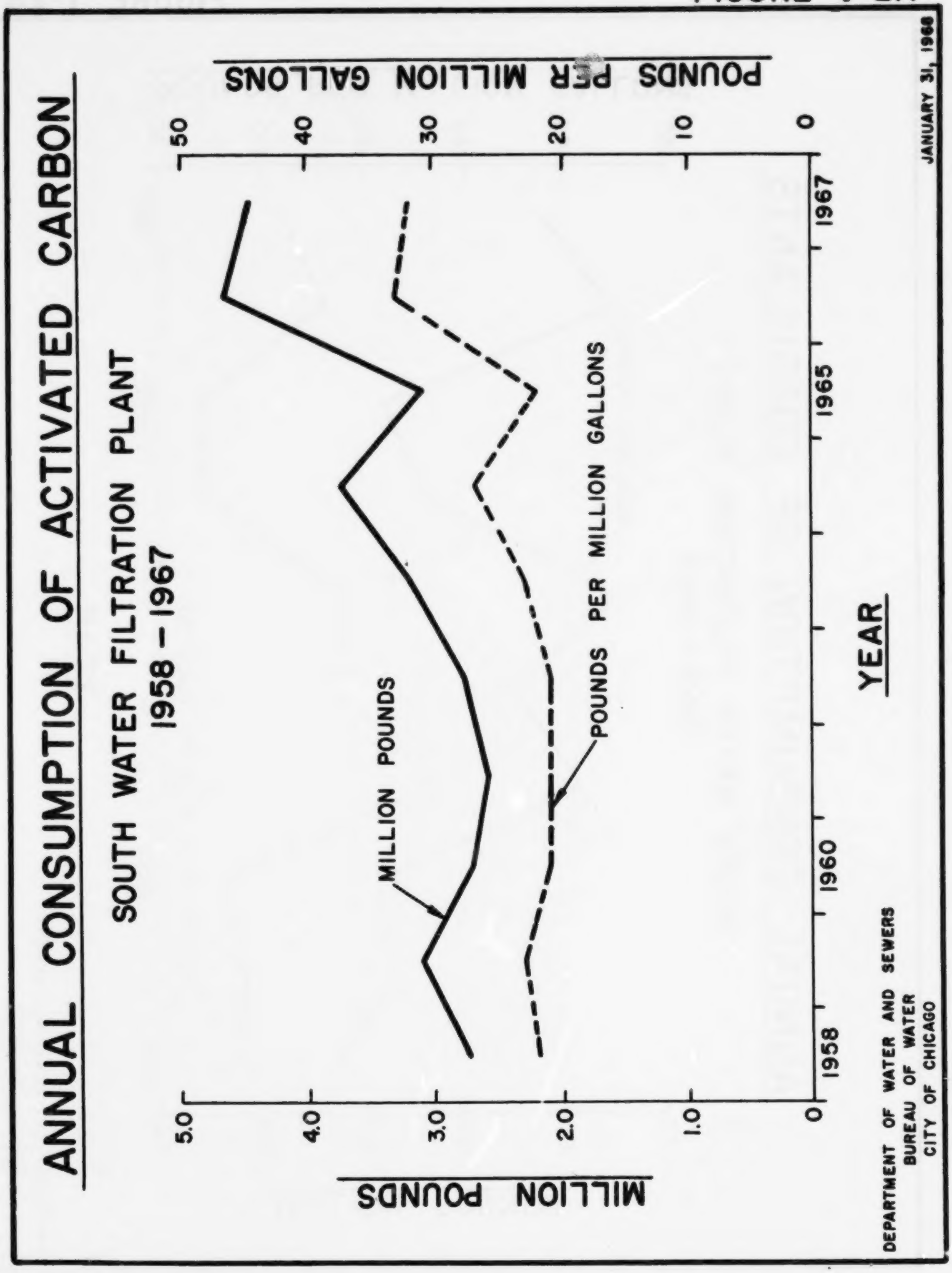
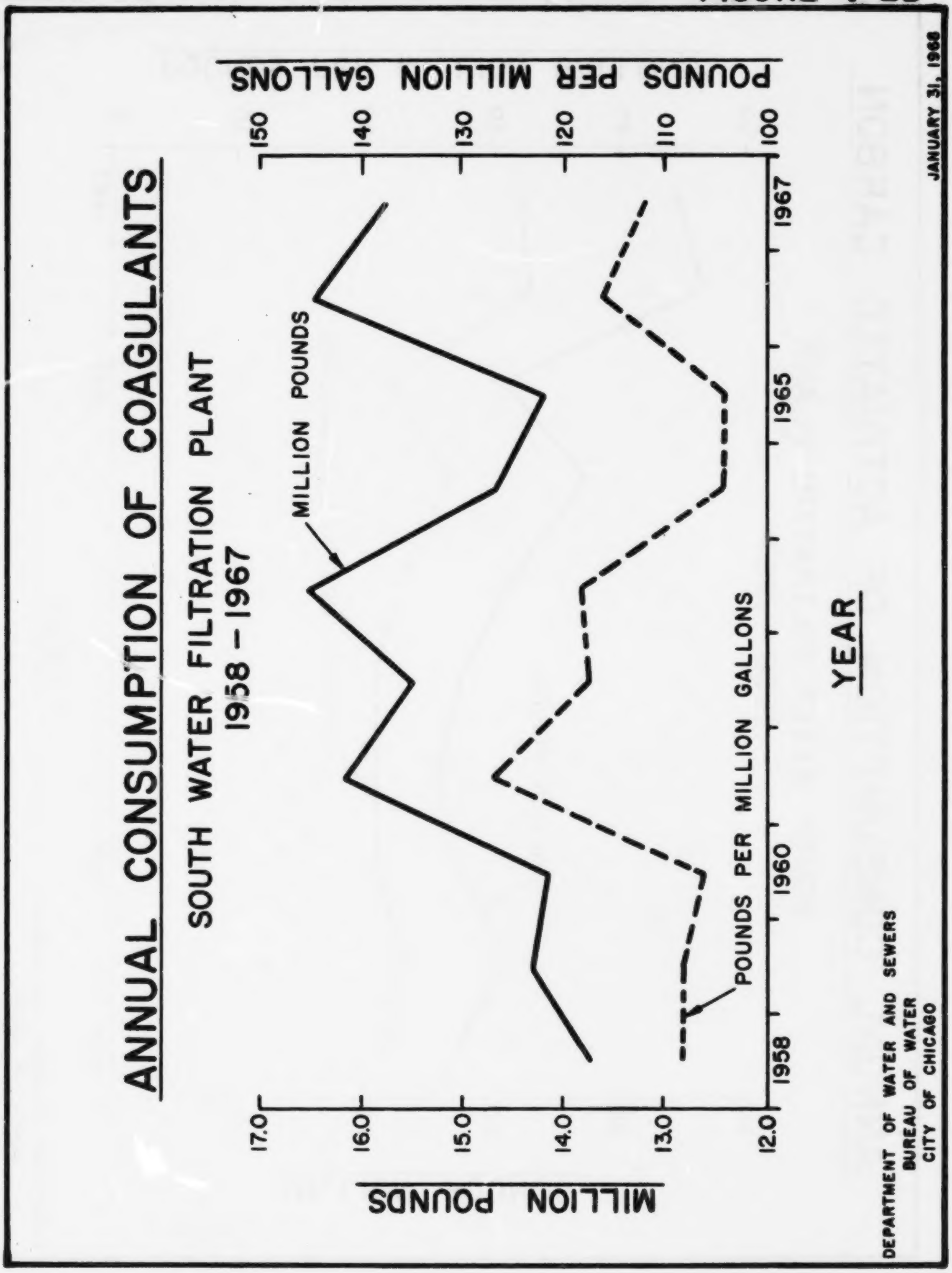
FIGURE I-2A



ANNUAL CONSUMPTION OF ACTIVATED CARBON

SOUTH WATER FILTRATION PLANT
1958 – 1967

FIGURE I-2B



ANNUAL CONSUMPTION OF COAGULANTS

SOUTH WATER FILTRATION PLANT

1958 - 1967

DEPARTMENT OF WATER AND SEWERS
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CITY OF CHICAGO

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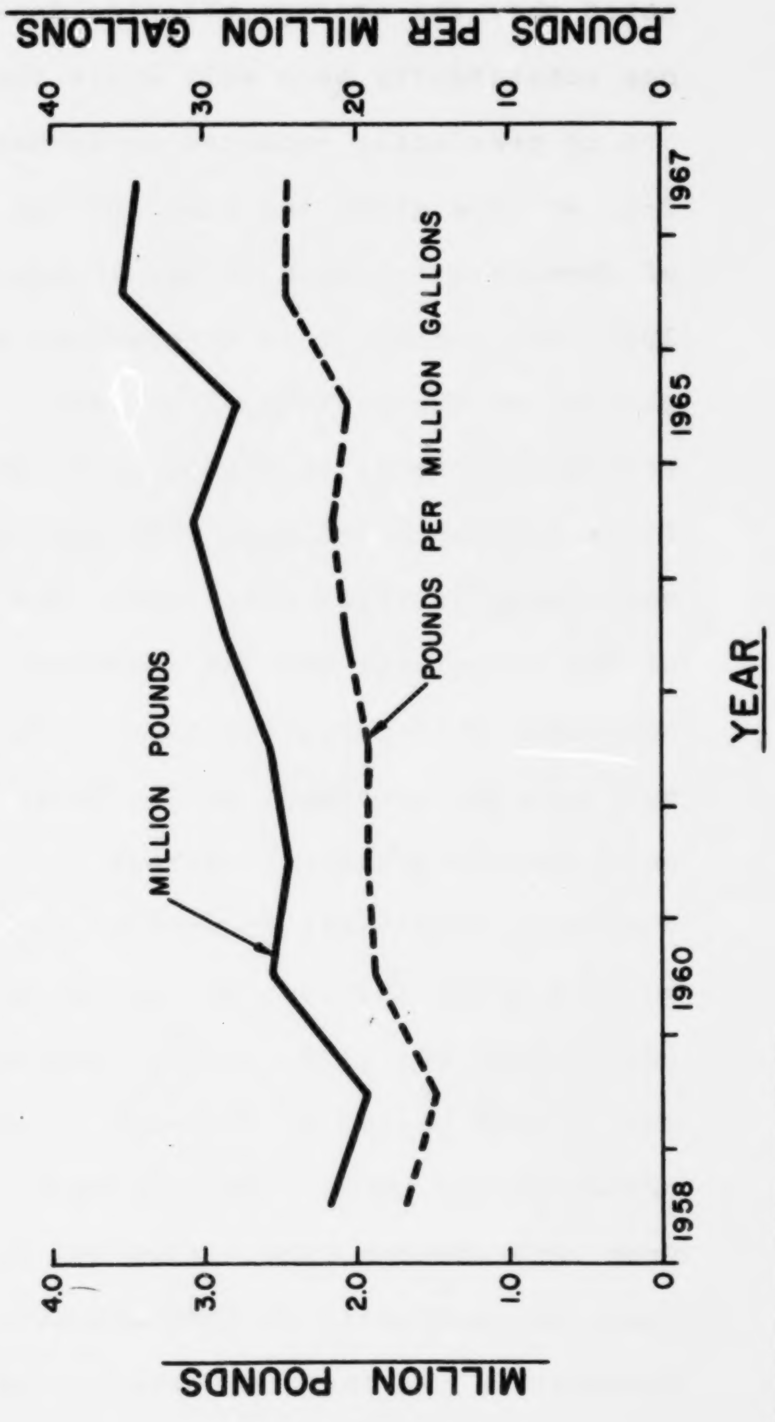
FIGURE 1-2C

ANNUAL CONSUMPTION OF CHLORINE

SOUTH WATER FILTRATION PLANT
1958 – 1967



DEPARTMENT OF WATER AND SEWERS
BUREAU OF WATER
CITY OF CHICAGO

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noted that the average chlorine dosage in lbs/mg has consistently been well above the level of 13 lbs/mg previously reported as normal. In Table I-3, we have given the costs of the three classes of chemicals for each of the 10 years of the 1958-1967 period. This information has been plotted on Charts I-3a, I-3b, and I-3c. For activated carbon, this adds up to $2,627,991.32. It is further noted that 1966 and 1967 show a very large increase over 1965. The same is true of the coagulants and the chlorine. It may be concluded that pollution is requiring more and more extreme treatment of the water with proportionately greater increases in the cost of treatment with these chemicals. In Table I-4, we have given the contract prices per ton (delivered) for alum, carbon, and chlorine, for the 10-year period of 1958-1967, inclusive. The prices of the three chemicals varied very little from 1958 through 1964. Alum and chlorine reached their minimum level in 1965 and have increased somewhat in the last two years. Carbon remained very constant from 1956 through 1966 but went up $9.90 a ton for 1967. While these increases in

TABLE I-3

Summary of Costs: Activated Carbon, Coagulants (Alum, Ferrous Sulfate) and Chlorine 1958-1967

Year	Activated Carbon		Coagulants		Chlorine		Total Water Treated (milgal)
	Total	$/milgal	Total	$/milgal	Total	$/milgal	
1958	$ 215,723.57	$ 1.69	$ 231,346.94	$ 1.81	$ 105,098.08	$ 0.82	127,478.9
1959	237,432.07	1.80	253,823.36	1.92	96,308.97	0.73	131,988.6
1960	213,435.65	1.60	329,818.94	1.80	121,546.69	0.91	133,198.4
1961	206,742.88	1.62	281,796.83	2.21	117,688.60	0.92	127,603.5
1962	230,698.90	1.74	274,973.31	2.07	120,121.66	0.90	132,993.5
1963	253,981.84	1.82	304,475.38	2.17	129,379.43	0.93	139,993.5
1964	296,684.97	2.10	272,187.75	1.93	140,934.75	1.00	141,096.0
1965	243,055.45	1.78	268,806.52	1.96	122,776.01	0.90	136,894.8
1966	361,222.18	2.54	303,788.28	2.14	162,470.73	1.14	142,083.8
1967	368,913.81	2.61	293,547.31	2.08	167,047.76	1.18	141,106.9
Total	$2,627,991.32	$ 1.94*	$2,724,564.62	$ 2.01*	$1,283,372.68	$ 0.95*	1,354,437.9

* 10-year average

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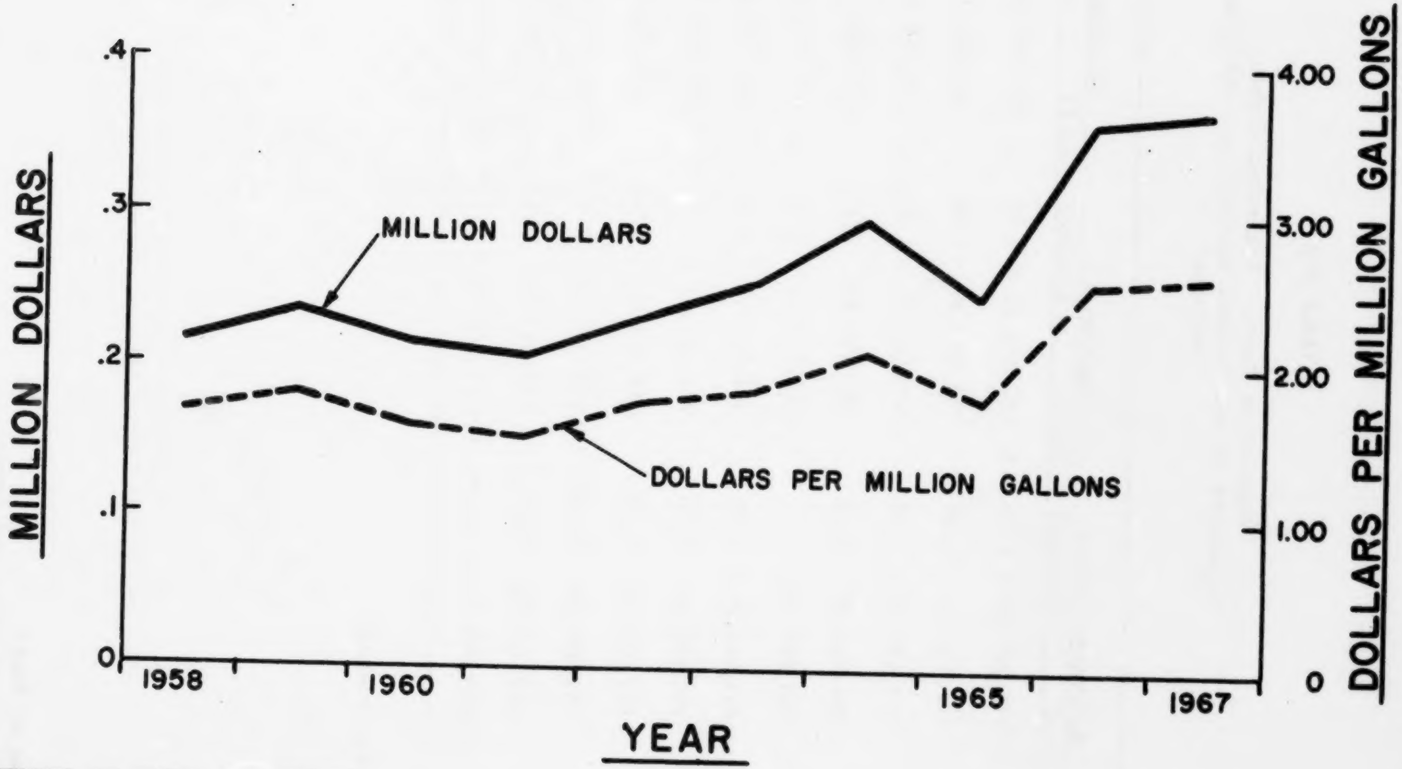
FIGURE I-3A

ANNUAL COST OF ACTIVATED CARBON

SOUTH WATER FILTRATION PLANT
1958 - 1967



DEPARTMENT OF WATER AND SEWERS
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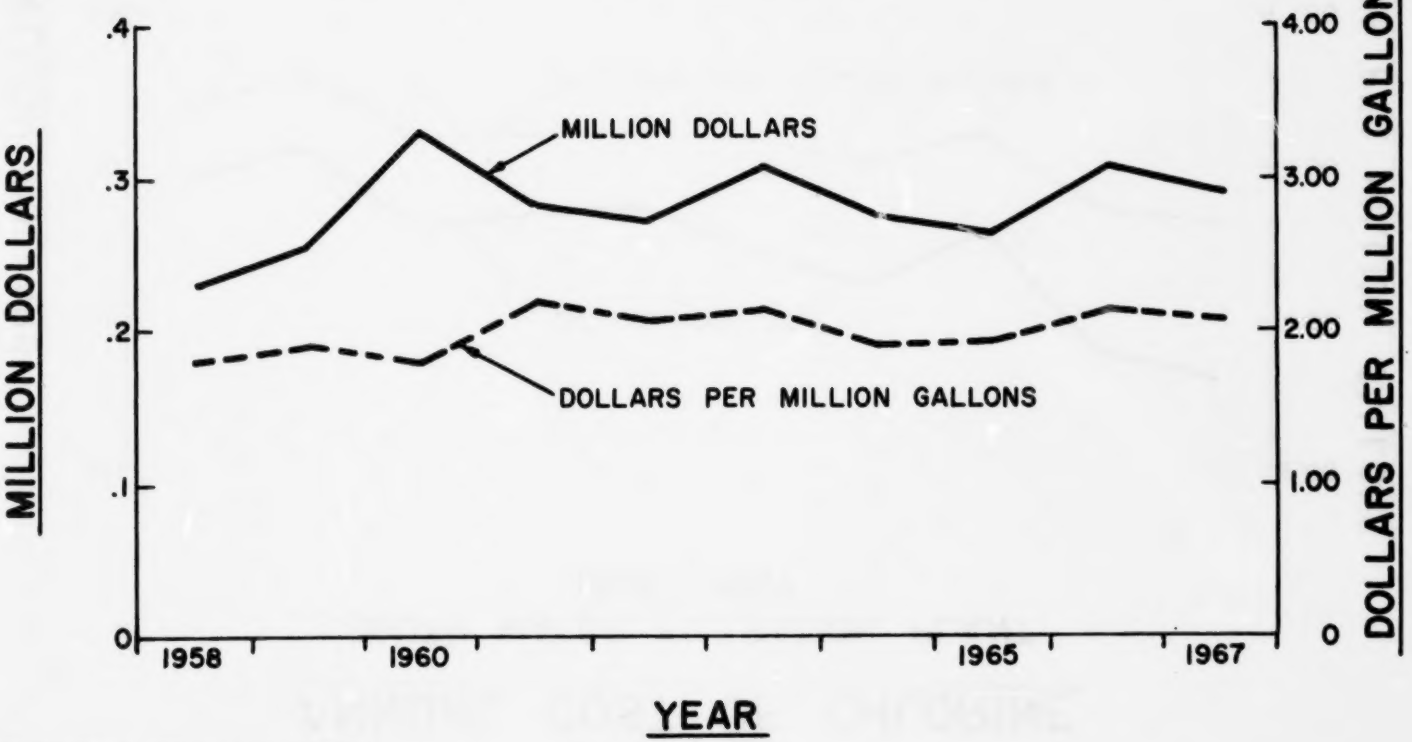
FIGURE I-3B

ANNUAL COST OF COAGULANTS

SOUTH WATER FILTRATION PLANT
1958 – 1967



DEPARTMENT OF WATER AND SEWERS
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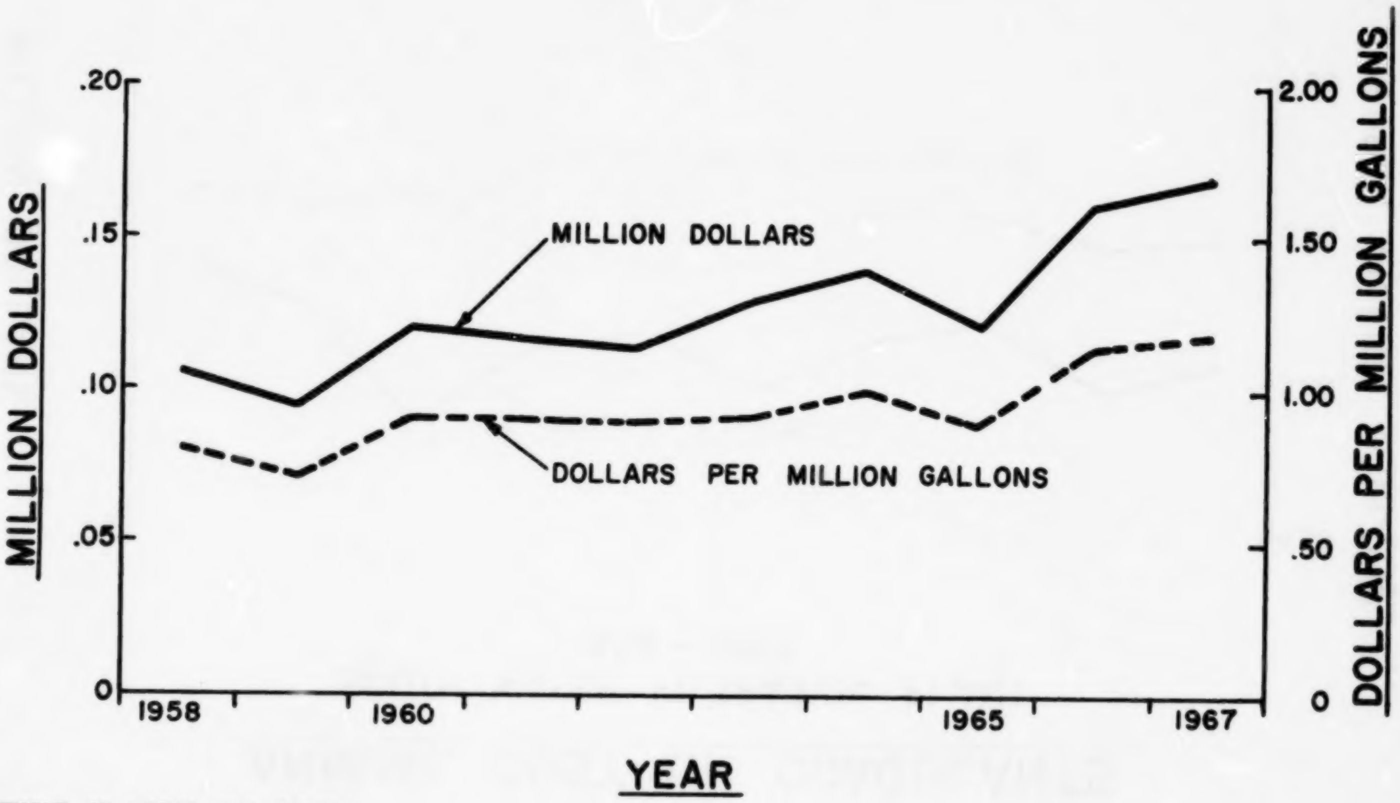
FIGURE I-3C

ANNUAL COST OF CHLORINE

SOUTH WATER FILTRATION PLANT
1958 - 1967



DEPARTMENT OF WATER AND SEWERS
BUREAU OF WATER
CITY OF CHICAGO

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TABLE I-4

CONTRACT PRICES PER TON
CENTRAL AND SOUTH FILTRATION PLANTS
1958-1967, Incl.

	Chemical		
Year	Alum (Liquid)	Carbon	Chlorine
1958	$39.07	$156.18	$96.74
1959	40.84	156.44	97.15
1960	40.86	156.53	95.54
1961	40.96	157.04	95.62
1962	41.35	161.01	92.94
1963	40.79	159.01	89.27
1964	41.30	157.24	92.24
1965	39.95	156.70	83.20
1966	40.55	156.70	95.20
1967	41.85	166.60	97.20

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prices are significant, they are only a part of the reason for the increases in the total costs of chemical treatment as outlined above.

Federal Water Pollution Control Administration Parameters Exceeded at SWFP

In Table I-5, we have listed in column 1, the values for 17 of the 24 parameters adopted by the FWPCA Conference for the southern end of Lake Michigan and the Calumet Area in January 1966. In column 2, we listed the quality criteria values against which comparisons were made. In column 3, we have shown the number of days in which the single daily average exceeded the quality criteria shown. In column 4, we have shown the number of days on which the single daily value exceeded the quality criteria. The coliform bacteria exceeded the daily average criteria of 2,500 per 100 ml on two days out of 365 in 1965; zero days out of 364 in 1966; and six days out of 365 in 1967. The fecal streptococci exceeded (number per 100 ml) the single daily value of 25, 14 days out of 127 in 1965; four days out of 294 in 1966; and 8 days out of 339 in 1967. The threshold odor exceeded the

LEGEND:
- ≯ Not more than
- > More than
- < Less than
- ≮ Not less than

TABLE I-5

DEPARTMENT OF WATER AND SEWERS - CITY OF CHICAGO
CONTROL POINT - OPEN WATER
SOUTH WATER FILTRATION PLANT - 1965, 1966, 1967
COMPARISON OF ACTUAL RESULTS WITH WATER QUALITY CRITERIA GOALS

PARAMETER	QUALITY CRITERIA	ANNUAL					
		Exceeding Daily Average			Exceeding Single Value		
		1965	1966	1967	1965	1966	1967
Coliform Bacteria	Annual Average ≯ 200						
(MPN/100 ml.)	Daily Average ≯ 2,500	2/365	0/364	6/364			
Fecal Streptococci (Number/100 ml.)	Single Daily Value ≯ 25				14/127	4/294	8/339
True Color	Annual Average ≯ 5						
(Units	Single Daily Value ≯ 15				0/1	0/218	0/309
Threshold Odor	Single Value ≯ 8				4/365	37/365	23/365
(Hydrocarbon and/or Chemical)	Daily Average ≯ 4	7/365	52/365	35/365			
Temperature (°F)	Single Daily Value ≯ 85				0/365	0/344	0/365
pH	Annual Median-Range 8.1-8.4						
(Units)	Daily Median-Range 7.7-9.0	0/365	0/364	0/365			
Dissolved Oxygen	Annual Average ≮ 90						
(Percent Saturation)	Single Value ≮ 80				2/4	0/10	
Ammonia Nitrogen	Annual Average ≯ 0.02						
(mg/L)	Daily Average ≯ 0.05	26/365	43/365	67/365			
Methylene Blue Active Substance	Annual Average ≯ 0.05						
(mg/L)	Single Daily Value ≯ 0.20				0/23	0/83	0/78
Chlorides	Annual Average ≯ 8						
(mg/L)	Single Daily Value ≯ 15				0/170	0/281	1/340
Cyanides (mg/L)	Single Value ≯ 0.025				0/28	0/11	0/18
Fluorides	Annual Average ≯ 1.0						
(mg/L)	Single Daily Value ≯ 1.3				0/227	0/277	0/339
Dissolved Iron	Annual Average ≯ 0.15						
(mg/L)	Single Daily Value ≯ 0.30				0/79	0/271	0/340
Phenol Like Substances	Annual Average ≯ 0.001						
(mg/L)	Single Value ≯ 0.003				48/74	224/272	9/198
Sulfates	Annual Average - ≯ 23						
(mg/L)	Single Daily Value ≯ 50				0/149	0/272	0/345
Total Phosphates	Annual Average ≯ 0.03						
(mg/L)	Single Daily Value ≯ 0.04				34/166	43/266	222/337
Filterable Residue	Annual Average ≯ 162						
(mg/L)	Single Daily Value ≯ 200				0/4	0/98	0/102

Number of days exceeding criteria/Number of days tested

January 31, 1968

Bureau of Water, Department of Water and Sewers, City of Chicago single value of 8 on 4 days out of 365 in 1965; 37 days out of 365 in 1966; and 23 days out of 365 in 1967. The daily average threshold odor value of 4 was exceeded on 7 days out of 365 in 1965; 52 days out of 365 in 1966; and 35 days out of 365 in 1967. The ammonia nitrogen daily average value of 0.05 mg/L was exceeded on 26 days out of 365 in 1965; 43 days out of 365 in 1966; and 67 days out of 365 in 1967. The phenol-like substances exceeded the single value criteria 0.003 mg/L on 48 days out of 74 days tested in 1965; 224 days out of 272 in 1966; and 9 out of 198 days in 1967. The total phosphates exceeded the single daily value criteria of 0.04 mg/L 34 days out of 166 days tested in 1965; 43 days out of 266 in 1966; and 222 days out of 337 days tested in 1967.

This exceeding of the criteria established for the open waters of Lake Michigan is an indication that the pollution of the southern end of the lake is certainly getting no better. The higher ammonia nitrogen and total phosphate values indicate that there is ample explanation for the continuing plankton nuisances that we have experienced at the SWFP intakes, particularly over the last three years. It had been hoped that the 1965 FWPCA Conference and the adoption of the official criteria in the January 1966 Conference would result in an improvement in the quality of the water in the southern end of Lake Michigan. The evidence submitted here would indicate that such is not the case. It is becoming increasingly difficult to treat the water in such a manner as to produce a satisfactory drinking water. As we have pointed out, it has also become very costly. If the entire FWPCA program of pollution abatement around Lake Michigan is to be successful, it must be implemented as quickly as possible, otherwise the pollution hazard in the Lake Michigan waters will continue to grow. I repeat what I have said before: the quality of water in the southern end of Lake Michigan is steadily deteriorating; the rate of degradation is rapidly increasing; and the costs and difficulties of treatment are increasing. If pollution is not abated to an appreciable degree in this area in the near future, we may find ourselves in extreme difficulty in trying to produce a satisfactory quality of drinking water.

Thank you.

MR. STEIN: Thank you, Mr. Vaughn.

(Applause.)

MR. STEIN: Are there any comments or questions?

Dr. Boruff.

DR. BORUFF: Mr. Vaughn, I am quite sure I know the answer to this question, but I think it is pertinent to the record.

We have had considerable testimony as to nitrogen and phosphorus loading of Lake Michigan from domestic, industrial and agricultural sources. My question is, do you add any chemicals in the treatment of Lake Michigan water for potable uses containing nitrogen and phosphorus compounds which are returned to the lake by way of your wash water or other streams back into Lake Michigan?

MR. VAUGHN: We add no material containing phosphates. At the South waterplant we use post ammoniation, which involves a dosage of two-tenths parts per million of ammonia, anhydrous ammonia, to perform chloramines in the finished water.

Now, our wash water averages less than two percent, so you see the total amount of ammonia nitrogen going into the lake is a very minimum.

However, as Mr. Jardine reported on Friday, we have understood the situation in which we will cease to return the wash water and the basin flushing sediments to the lake.

DR. BORUFF: Thank you, sir.

MR. STEIN: Are there any further comments or questions?

Mr. Poole.

MR. POOLE: I thought I detected, Jim, throughout your report, and I read it yesterday and then I listened carefully today, until you got up to the last page, that the last half of 1967 had certainly been better than 1966. Did I misunderstand you in that?

MR. VAUGHN: Well, to the degree that there was a good period in the middle of the year. October was not too good a month and December was certainly a bad month, using 500,000 pounds. That knocked down the annual average somewhat. There was five months in between that.

But I would say that the overall effect has not improved.

MR. POOLE: I am merely raising that because I don't quite share your view right at the end of it. You say the rate of degradation is rapidly increasing.

Now, if you look at your table, the long table that you had on the screen there, it is on page 39 (this volume page 1572), the ammonia nitrogen did increase in 1967 and the phosphates increased in 1967, but the threshold odor was better in '67 than in '66 and the phenolic substances were certainly a good deal better in '67 than in '66.

In view of that, I am not saying that you have added good water, certainly, but I would like to hope that the trend that apparently started to develop in the latter part of '67, but which went off schedule in December, I hope that trend will increase.

I have only one other comment. We have considerable coliform data on the Dickey Road Station on the Indiana Harbor Ship Canal, and while we have some high ones, we don't show coliforms in the range that you showed on your chart for an annual average. In fact, I don't think that we have any where there is a single one that is as high as your annual average. Maybe we are going to have to get the laboratories together on coliforms.

MR. VAUGHN: You are aware that we have this laboratory directors' group as a subcommittee of the technical advisory committee which meets once a month in attempting to coordinate all of the test methods. They have, I believe, 480 samples being analyzed for phenols, phosphates and ammonia nitrogen so far, and when they will get into the coliform end of it I do not know.

We have now officially the first of this year gone over to the membrane and filter technique, which we are using, as compared to the multiple tube method.

I wish I could say that I thought that there was a trend of improvement. Of course, hopefully, you look at the good six months, I look at the overall average, and I look particularly at the bad December. In other words, it is a case of what are you doing to us recently, and I don't think it is good.

And for your information, we don't have

the data, but we have had a very bad January so far in '68.

MR. STEIN: Bad in what respect? What is your item? What did you find it high in, coliforms, phenols, ammonia nitrogen, or what, in '68?

MR. VAUGHN: We are finding the values exceed the parameters.

MR. STEIN: With what items, coliforms or the others?

MR. VAUGHN: The threshold odor has been the bad thing in January, accompanied by high ammonia nitrogens and phosphates and phenols.

MR. POOLE: I have just one other question, and this basically for my enlightenment.

Do you think the dead alewives had anything to do with the coliform content of the lake? I am asking that because some of our beach samples in the eastern portion of Indiana took some dips after the large die-off that caused me to wonder if they may have been something of a factor.

MR. VAUGHN: I have no direct knowledge of that fact. The alewives were not a problem to us in '66 and '67. They were a nuisance. But in '65 we put this net around the intakes of the central plant, which has been very effective in diverting the fish. We had some troubles at the intakes. But I believe the highest day in '67 was 1,100 pounds removed from the streams, the intake basin of the south plant.

We have added to the coliform bacteria parameter, we did this in the technical committee, the total coliform and the fecal streps in order to get the total picture, and I have not yet seen the fecal strep results of this past month. So I don't know how they have gone.

But I couldn't say positively that they did increase the coliform content.

MR. STEIN: Are there any further comments or questions?

Mr. Oeming.

MR. OEMING: Mr. Vaughn, on page 4 of your report (this volume page 1545) you indicated that you had a maximum value of 13,000 coliform orgamisms per 100 ml in 1967. Could you tell me when that maximum occurred?

MR. VAUGHN: January 25 is the best date I remember. It was in January,towards the last week of January anyway.

MR. OEMING: I see. O. K.

One other point, Mr. Vaughn. I wonder, I think I heard you say that you attributed the reduction in phenols, and I am not sure, of the Calumet River to the chlorination of stormwater overflows. Am I right, did you say that?

MR. VAUGHN: I would say that the reduction could be attributed to that because, of course, we know chlorine has a certain oxidizing effect and phenols are rather readily oxidized.

MR. OEMING: Would you have any information that you could present to the Conferees that would indicate that anything else was responsible for the reduction in phenols?

The reason I ask this question, Mr. Vaughn, is that I have some reservations about whether the chlorination of stormwater overflows is going to take very much phenol out of the water by itself.

MR. VAUGHN: Well, it could be said that there had been an abatement of pollutants in the Calumet River.

MR. OEMING: But you don't know that?

MR. VAUGHN: I don't know that.

MR. OEMING: O. K., that is all I have.

MR. STEIN: Mr. Vogt.

MR. VOGT: Jimmy, knowing of how you and your associates strive to produce a high quality of finished water, and John Bayliss* before you, would you say that any of these increased costs might be attributed to your attempting to produce a higher quality of finished product through the years?

MR. VAUGHN: Well, certainly we try to produce water that will satisfy the customers, and on those very rare occasions on which we have had taste and odors get through the plant the telephone never stops ringing. We have none of us put a cash value on each telephone call. Mentally I have said that each telephone call costs us $1,000 in public relations effort, but that is a pure guess.

* deceased

But believe me, Chicagoans have become accustomed to a good water and they demand it. If we don't supply it, we catch the devil.

MR. VOGT: I realize this.

One other comment for clarification or question for clarification. As I recall, as an aside, and I don't believe it was mentioned specifically in your text, you stated that the wind conditions and currents as described by Dr. Baumgartner were a factor in these slugs. Is this correct?

MR. VAUGHN: Yes, on a number of occasions--

MR. VOGT: Is this a very significant factor in--

MR. VAUGHN: On a number of occasions we have made wind vector analyses of the travel of the slugs and they are included in special reports that we have sent to the Bureau office, and we find that they essentially follow the pattern described by Dr. Baumgartner.

MR. VOGT: I see. Thank you very much.

I have one other comment, Mr. Stein.

MR. STEIN: Go ahead.

MR. VOGT: I think this is more in the nature of a comment for the record.

We were interested in determining the experience of our water-treatment-plant operators in Michigan which use Lake Michigan as a source of supply to determine whether they have found it increasingly difficult to produce a high quality water. And we queried the superintendents, starting with our southernmost plant at St. Joe, Benton Harbor, South Haven, Grand Haven, and so on, going up to Muskegon. And it was the concensus of opinion of these people who have been treating Lake Michigan water for a good many years that they have not found--let me put it in a positive way--that it is the concensus of their opinion that they have not found it increasingly difficult to treat Lake Michigan water and produce a high quality product.

MR. VAUGHN: Well, I disagree--

MR. VOGT: And I don't mean to be taking anything from Jimmy Vaughn, from Mr. Vaughn's statement here. It is just that I think this ties in with what you earlier said and also how wind conditions--

MR. VAUGHN: I think, if you recall that chart on showing the number of days of maximum usage, page 27 (this volume page 1574) the fact that the maximum carbon dosage did not follow the maximum threshold odor. In other words, with the maximum threshold odor, there was still a higher maximum carbon dosage. Our experience indicates that it has, overall picture, been more difficult to produce a satisfactory water.

The change in type of odors through a pollution period is interesting. Let's assume that there are hydrocarbon odors. They are first volatile and gassy and then they become more like kerosene, and then about the fourth or fifth day they smell somewhat like the lee side of a burning garbage heap on a rainy day, and that stuff is almost impossible to get out.

MR. VOGT: Mr. Chairman, I think the only point I am making here is that the quality of water at the Michigan waterworks intakes hasn't shown the rate of change that Jimmy has experienced here in Chicago.

MR. KLASSEN: Mr. Chairman, may I ask a question of the questioner?

Since you mentioned Grand Haven, John, would you consider that Grand Haven has a Lake Michigan intake? I think they have wells, infiltration galleries right on the beach.

MR. VOGT: I didn't specifically mention Grand Haven, Clarence. As you indicated, Grand Haven does have the Raney-type collector where the intake is located below the bed of the lake and I wasn't considering Grand Haven.

MR. KLASSEN: O. K.

MR. STEIN: Mr. Vogt.

MR. VOGT: My mention was to South Haven.

MR. KLASSEN: Oh, I am sorry.

MR. VOGT: Larry just reminded me that I made reference to South Haven.

MR. STEIN: Mr. Poston.

MR. POSTON: I would like to commend Mr. Vaughn for a very informative report with a lot of information on quality characteristics.

And since the Chicago Water Department has for a long period of time looked into the quality of water not only at their intakes but have also been active in going to other parts of the south end of Lake Michigan and investigating quality from various sources, I wondered if he had any suggestions that he might give to the Conferees for surveillance in the future. Surveillance, I think, is one of the matters or subjects that the Conferees must consider very seriously if we are to come through not only with solutions but see that solutions are followed through with and are effective in getting the quality of water that we want.

I wondered if you had any suggestions on surveillance that you would care to give to the--

MR. VAUGHN: While our surveys of the Calumet River Ship Canal area is weekly, I think an increase in the number of continuous monitors is certainly indicated. I don't think that the continuous monitors at present that indicate total dissolved solids and pH and temperature are particularly significant. I would like to see such things as ammonia nitrogen phosphates, and you can't have a continuous quantitative measure of threshold odor.

We have considered the thought of equipping a boat with a threshold odor monitor, which was developed originally by Mr. Gerstein and revised by us, in which the water is passed through a heating element at 140 degrees Fahrenheit and sprayed in an open top bell jar and that is the way we instruct our supervising engineers to judge the water. It takes 20 minutes to run a threshold odor test, and with no reserve storage, if we let 20 minutes of bad water get by us we are in deep trouble.

So we have these continuously running threshold odor monitors, and the supervising engineer during an odor period constantly sniffs them and he is instructed to go up with dispatch and down with discretion as regards carbon dosage.

And so continuous monitoring of threshold odor, phosphates and ammonia nitrogen I think are certainly indicated,particularly from Indiana Harbor Ship Canal area and certainly critical points along the lakeshore, including the mouth of the Calumet River.

MR. POSTON: Thank you.

MR. STEIN: Mr. Wisniewski.

MR. WISNIEWSKI: I would like to ask Mr. Vaughn to detail for us how the filtration rate has changed over the years at his plant. Are you filtering through at higher rates than you did formerly?

MR. VAUGHN: Well, the averages of the waterplant have increased by about three percent per year. The maximum days have increased at a somewhat greater rate. That is why we expanded the south plant 50 percent. However, we now have a total of 2,600 million gallons per day filtration capacity and we have not approached that on any day yet.

On a certain day in 1965, for reasons not mentionable here, we reached a maximum hour of some 1,700 million gallons. But that was not normal consumption of water.

MR. STEIN: Are there any further comments or questions?

Mr. Vaughn, I think you have given a

very interesting statement. As I understand this from the data,Mr. Poole's comments and possibly Michigan's, we still do not have any glorious unanimity in the determination of whether we are having accelerated degradation as dependent on water-treatment plants. Another fact that has come out which we should check--since we have had that technical committee working on the tough items like ammonia--is that we have sort of let the coliforms take care of themselves because that is an old type of test. My experience through the country is that when we use the multiple tube test and not a membrane filter test we are likely to get disparity of results on the coliforms between two groups such as Mr. Poole and you people indicated. I am hopeful that we can come up with uniform techniques and at least have the same figures.

Then I have one question. I know that the oil companies in Indiana have put in a considerable amount of treatment facilities since we started this Conference. What always puzzled me is why this wasn't reflected more in the quality of the water intake that you indicate.

MR. VAUGHN: May I add one final statement?

It is hoped that in the words of the song from the Man from La Mancha that we have not dreamed the impossible dream; that we are not attempting to right an unrightable wrong.

Thank you, gentlemen.

MR. STEIN: Thank you.

(Laughter and applause.)

MR. STEIN: For the present, we have two Congressional statements, which are going to be relatively brief, from Congressman Rostenkowski and Congressman Pucinski. A close associate of theirs and ours will read their statements, Mr. Peter Kuh.

Mr. Kuh.

FEDERAL PRESENTATION (CONTINUED)

MR. KUH: Thank you, Mr. Stein.

I know that both Congressman Rostenkowski and Congressman Pucinski were extremely anxious to be here. They had planned to present these statements in person on Friday afternoon, and the extended Congressional debate on the Truth in Lending legislation made it impossible to get to Chicago in time.

I would also like to say that I am on the staff of Secretary Edwards' office, but my reading Congressman Rostenkowski's statement does not indicate either Administration approval or disapproval of certain legislative proposals which he includes in his statement.

STATEMENT OF
THE HONORABLE DAN ROSTENKOWSKI
U. S. HOUSE OF REPRESENTATIVES
STATE OF ILLINOIS

Mr. Chairman, I want to congratulate you and the distinguished Governors for calling this timely conference on the problems of Lake Michigan. It is mutual cooperation and an understanding of the problem that faces us that is required to rectify a bad situation that is growing worse from day to day.

I have studied with growing concern the reports of how Lake Michigan is being daily flooded with domestic and industrial wastes, with acids and oil, with detergents and debris and with the discharge from large ocean-going vessels and the myriad of pleasure craft.

Today practically every important water resource in this country is already polluted to some extent. Some of our rivers are little better than open sewers. Lake Erie is itself threatened with extinction from pollution. This has not just happened overnight, it has taken many years of neglect for the problems of the Great Lakes to attain their present state of crisis.

A great Justice of the Supreme Court, Oliver Wendell Holmes, more than three decades ago made the observation,

> "A river is more than an amenity, it is a treasure."

One wonders what superlatives he would have supplied had his remarks been directed to an evaluation of Lake Michigan.

With all due respect to Justice Holmes, the full value of Lake Michigan to the four States which border on its shores cannot be calculated.

CONGRESSMAN ROSTENKOWSKI

Its many uses can be counted, but its many treasures are irreplaceable.

It is the source of our drinking water, our electric power, and our fishing industry. It is the key to our commercial growth and the arena of our recreational activity. It also, in addition to these wonderful attributes, is becoming the garbage disposal unit of the Midwest.

My constituents have written me numerous letters asking me to do something to save our lake. I have tried to do just that by introducing two bills during the first session of the 90th Congress. The problems of pollution are many and I'm sure that no one understands all the ramifications. But in the case of a lake, where there is no current which will flush away the results of our pollution, our only alternative is to stop the causes of pollution as soon as possible.

The bills I introduced call for (1) a halt in the dumping of untreated sewage into the lakes from the lake port cities; (2) a halt in discharge of untreated sewage and dredging from Federal installations; (3) a halt in the discharge from boats and vessels; (4) a halt in the use of detergents; and (5) an extension of the Oil Pollution Act, 1924, to cover all types of oil discharge into our waters.

To encourage industry, I introduced a tax incentive, allowing a tax credit for the cost of erecting and installing a water pollution control facility. I am hopeful that, even though it is believed that once a lake becomes polluted it can never be reclaimed, this tax credit may inspire the development of a device to restore the proper oxygen content to the water.

I stand ready to cooperate with you, Mr. Chairman, and with the Governors of each State here represented to effect whatever is found to be necessary to secure success in our common endeavor.

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STATEMENT OF

THE HONORABLE ROMAN C. PUCINSKI
U.S. HOUSE OF REPRESENTATIVES
STATE OF ILLINOIS

I am happy to have this opportunity to present my views on the pollution problems of Lake Michigan and on the urgent need for action.

_ake Michigan is a valuable natural resource which we are slowly loosing to misuse and to pollution of many types: for instance, to municipal, industrial and shipping wastes; plant nutrients, phosphates and nitrates; pesticides, insecticides and herbicides; detergents; salts, acids and sludges; petrochemical and chemical residues; and heat.

If Lake Michigan suffers the same fate as Lake Erie, the whole region will suffer and, in fact, it is beginning now to feel the effects of our misuse and our mistakes in water and waste management.

I regard this Conference as a critical landmark in our continuing uphill fight to protect, preserve and improve the quality of Lake Michigan's waters.

To date, we have based much of our economic growth on this great resource, on its fisheries and recreational and transportation potential, and on the fact that it has been a convenient sink for our untreated wastes.

CONGRESSMAN PUCINSKI

But these untreated wastes are now endangering many other uses of the lake. Eventually these wastes will endanger our economic growth itself if we do not act now to prevent pollution, to limit the damage it creates, and to restore the environment that it has damaged.

The future projected trends in population, in industrial and economic growth, in demands for water for municipal use, outdoor recreation and fish and wildlife use, and the trends in the creation of waste products--all point to a deepening pollution crisis for Lake Michigan if we do not act soon to prevent pollution and to clean it up where it occurs.

I am happy to see, at this Conference, such great interest on the part of the press, the public, private individuals and organizations as well as by Federal, State and local governments.

For if we are to prevent further damage to Lake Michigan, the active cooperation and effort of all groups--public and private, government and non-goverment--will be necessary, now and in the future.

The massive die-offs of alewives in Lake Michigan are causing great losses to our cities, industries, and recreational and tourist businesses. Before next summer, when we may again experience massive pollution of our beaches by alewives, we need to act to prepare for these pollution problems which arose this past summer, but for which we were not ready.

I realize that we do not know enough about alewives and that there is need for more study and knowledge. But I think we know enough now and have had enough experience in removal and disposal of dead alewives to be ready for the cleanup and removal operations which will probably be necessary next summer.

But even while we use our existing knowledge to prepare to clean up the alewife pollution which will probably continue to plague Lake Michigan's shores, we should also be acting to bring the whole alewife population in the Great Lakes into better balance through, for instance, introduction of predators.

Finally, Mr. Chairman, this Conference must recommend actions which will prevent Lake Michigan's becoming another Lake Erie.

As I see it, we do not have much time. Lake Michigan, perhaps, is in the same condition and under the same threat as was Lake Erie some decades ago. And if we do not act promptly and effectively today, decades from now, Lake Michigan--with its slow circulation patterns--may well become another dying lake.

You have my full support, and I wish you much success. The Congress and the public will be watching and waiting for progress.

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MR. KUH: Thank you.

MR. STEIN: Thank you.

We have one short telegram here addressed to the Chairman:

"In behalf of the people of Hyde Park and Woodlawn, who live at the very edge of Lake Michigan, who have watched its water become more polluted, the noxious algae more luxuriant, and the beaches more offensive than ever, and who have seen these conditions deteriorate not only during the last ten years but especially in the last two years since the previous Federal Conference to end pollution in Lake Michigan, I urge you to set high standards and enforce them without further delay."

Signed "Leon M. Despres, Alderman, Fifth Ward, City of Chicago."

If we may continue with the Illinois Presentation.

ILLINOIS PRESENTATION (CONTINUED)

MR. KLASSEN: Mr. Chairman, I am keeping track of the Federal time, and we will ask equal time for Illinois.

We had rescheduled from Friday the presentation from the Metropolitan Sanitary District of Greater Chicago by President Egan. I have just been informed that Mr. Egan has not been released from the hospital and so we are rescheduling this hopefully for tomorrow.

At a specific request, because of a tight schedule, we want to work in a very short statement here from the Illinois State Medical

Society that has been working very closely with us, and this will be given by Dr. Clarke Mangun on behalf of the Illinois State Medical Society. I think he is Chairman of their Environmental Committee, and formerly Regional Director for HEW, Public Health Service.

STATEMENT OF CLARKE W. MANGUN, JR., M.D.
CHAIRMAN, ENVIRONMENTAL HEALTH COMMITTEE
ILLINOIS STATE MEDICAL SOCIETY

DR. MANGUN: Mr. Chairman, ladies and gentlemen.

This statement is a summary of an article to be published in the Illinois Medical Journal, which has been approved by the Council on Scientific Advancement and the Board of Trustees of the Illinois State Medical Society. The article and this summary, therefore, represent an official statement of policy of the Illinois State Medical Society.

Physicians have an interest in clean water. We are concerned and alarmed by information in the news media and scientific publications that tell of increasing pollution of Lake Michigan. We estimate that the population of Illinois that uses Lake Michigan water constitutes only 1.5 percent of the world population, yet the water in Lake Michigan constitutes about 7 percent of all the fresh surface liquid water in the world. This natural resource must not be lost.

As physicians we can understand how the demands of population growth, urbanization, industrialization and economics have exceeded the technology and resources of water pollution control agencies in their efforts to preserve the high quality of Lake Michigan water. The effects on health of some substances that may be present in some public water supplies is fairly well known, whether they are present in insufficient, optimal or excessive amounts. However, the effect on health of many other substances is not known, whether they are old or new, present now or likely to be present in the future, in any amount or for any period of time. Water pollution from new industrial processes, insecticides, herbicides, fungicides and fertilizers are examples of these unknowns.

The Illinois State Medical Society believes that its members can be of service to the public in three ways in water pollution control:

1. As individual citizens we can give carefully considered support to water pollution control as a public policy and take individual responsibility not to pollute public waters as we may use them.
2. As professional persons with a scientific education, we can help inform the citizenry that as consumers and taxpayers clean water has a cost that must be paid. Joining in the clamor for clean water is easy, but paying higher costs for consumer products or voting higher rates for water and sewage treatment requires a courageous and informed citizenry. The Illinois State Medical Society is on record as supporting the one billion dollar bond issue for pure water, clean

air and recreational purposes which will be voted upon on November 5, 1968 in Illinois.

3. As practicing physicians with a crucial responsibility for the diagnosis, treatment and prevention of disease, we may be the first to suspect or confirm an effect on health from water pollution. We will remain alert to this possibility in our continuing cooperation and support of the public health. It is conceivable that the ultimate and overriding effects of continued water pollution will be on the health of the people rather than being economic or esthetic.

We thank you for this opportunity to appear at this hearing and offer our support.

Thank you.

MR. STEIN: Thank you, Dr. Mangun. It is good to see you again.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, thank you very much,

sir.

MR. KLASSEN: Continuing up the north shore beyond Chicago, and as a corollary to the Chicago Water Department presentation, we have three short presentations here regarding health and water supply.

The first will be given by the Director of the Evanston City Health Department, who I think will also make the presentation, a brief one, on behalf of the Evanston Superintendent of Water and Sewers. It will be given by Dr. Allan Filek.

STATEMENT OF DR. ALLAN FILEK
PUBLIC HEALTH DIRECTOR
EVANSTON NORTH SHORE HEALTH DEPARTMENT

DR. FILEK: Thank you, Mr. Klassen.

Mr. Stein, Conferees, ladies and gentlemen.

I will read the statement by Mr. Frye first, if you don't mind.

DR. ALLAN FILEK

STATEMENT ON THE EVANSTON WATER SUPPLY

For Presentation at

Lake Michigan Four State Conference

by

H. R. Frye, Superintendent
Water and Sewer Department
Evanston, Illinois

The entire water supply for the City of Evanston and the Village of Skokie is obtained from Lake Michigan and treated in a modern filtration plant at the foot of Lincoln Street in Evanston. The combined area served is 18.3 square miles and the population is approximately 160,000.

Lake pollution and a high typhoid rate caused Evanston to construct and place in operation in 1914 the first municipal water treatment plant in this area. Diversion of untreated sewage from the lake and the construction of sewage treatment plants by the Metropolitan Sanitary District greatly improved the quality of water taken in at the Evanston intakes and for many years Evanston enjoyed a water supply which was comparatively inexpensive to treat.

While the raw water quality has not

reached the high intensity of pollution experienced by plants located adjacent to industrial or municipal waste sources, the rate at which the various indicators of pollution are increasing is alarming. As an example, the amount of aluminum sulphate required in the treatment plant to produce an acceptable water has increased from 86 pounds per million gallons in 1957 to 125 pounds per million gallons in 1967. This represents a dosage increase of 45 percent and a treatment cost increase of $.81 per million gallons.

Similar increases have been experienced in two other treatment chemicals, chlorine and activated carbon, both of which are required in greater amounts as water quality decreases.

Chlorine requirements have increased from an average of 10 pounds to 15 pounds per million gallons, or 50 percent between 1959 and 1967.

Activated carbon, which must be applied in greater amounts as tastes and odors increase, averaged only 20 pounds per million gallons in 1957 and now averages 35 pounds per million gallons.

This 75 percent increase in dosage represents $1.59 per million gallon greater treatment cost.

While the increases in coliform counts, plankton, chlorine demand, ammonia nitrogen, chlorides, taste and odor, etc., are all warning signs of the degradation of our water supply, another sign is more apparent to the public. For the last five years the growth of a filamentous algae known as Cladophora along the shores has become an annual nuisance on our beaches and shoreline. As far as the water works is concerned, it is more than a nuisance, it is expensive to control and may endanger the water supply.

The water intakes empty into two intake wells equipped with stationary screens through which the water must flow to reach the pumps. Clogging of the screens with the algae keeps a crew of laborers busy for several weeks in the summer, raising the screens manually and washing them off with water jets. Sudden clogging during the night hours could create an emergency. To assure a constant supply during these periods, the Evanston City Council has authorized an expenditure of $55,000 for the installation of traveling screens in the intake wells.

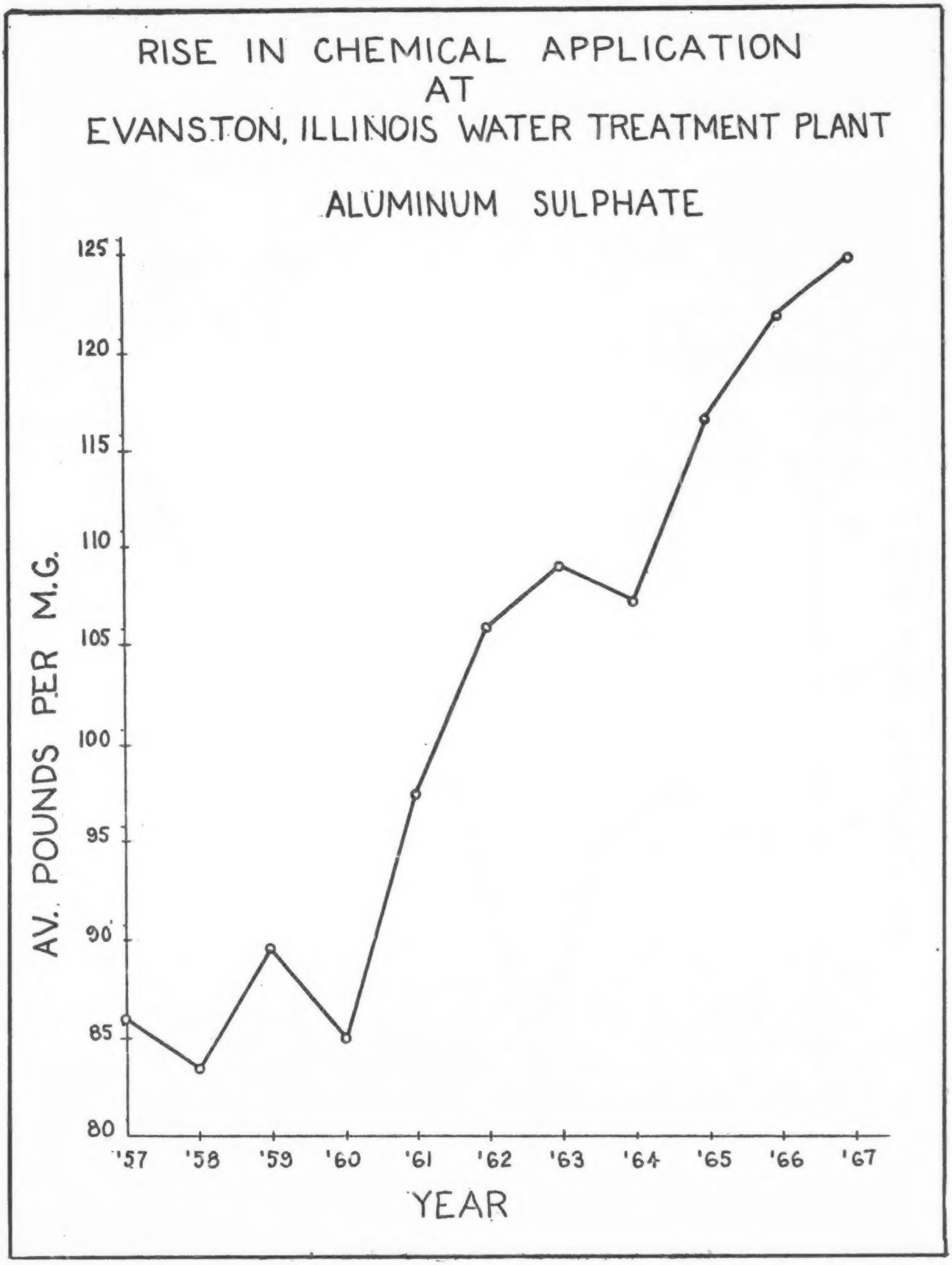
The screens will also remove fish or other debris from the incoming water and protect the plant against a sudden deluge of alewives.

While Evanston's water problems to date have been less than those closer to the sources of pollution, our experience and observations indicate that the effects of pollution have not leveled off but are still increasing, and further intensified efforts toward the elimination of the sources of contamination is strongly urged.

DR. FILEK: Now, that is the end of Mr. Horace Frye's presentation, except that the report does contain three charts on the increase in aluminum sulphate, carbon and chlorine.

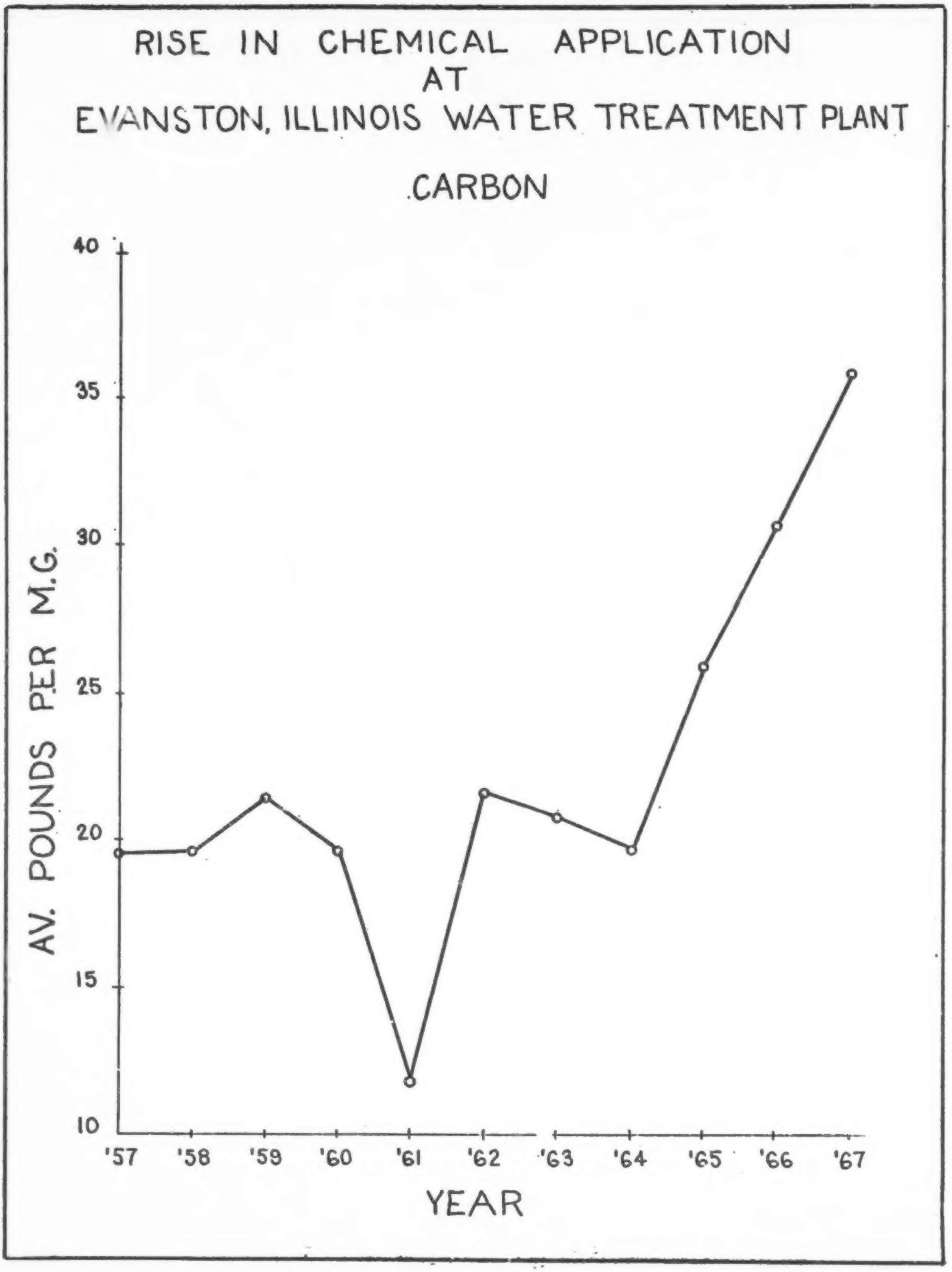
MR. STEIN: Those charts will be included with his statement in the record.

(Which said charts are as follows:)



RISE IN CHEMICAL APPLICATION
AT
EVANSTON, ILLINOIS WATER TREATMENT PLANT

ALUMINUM SULPHATE

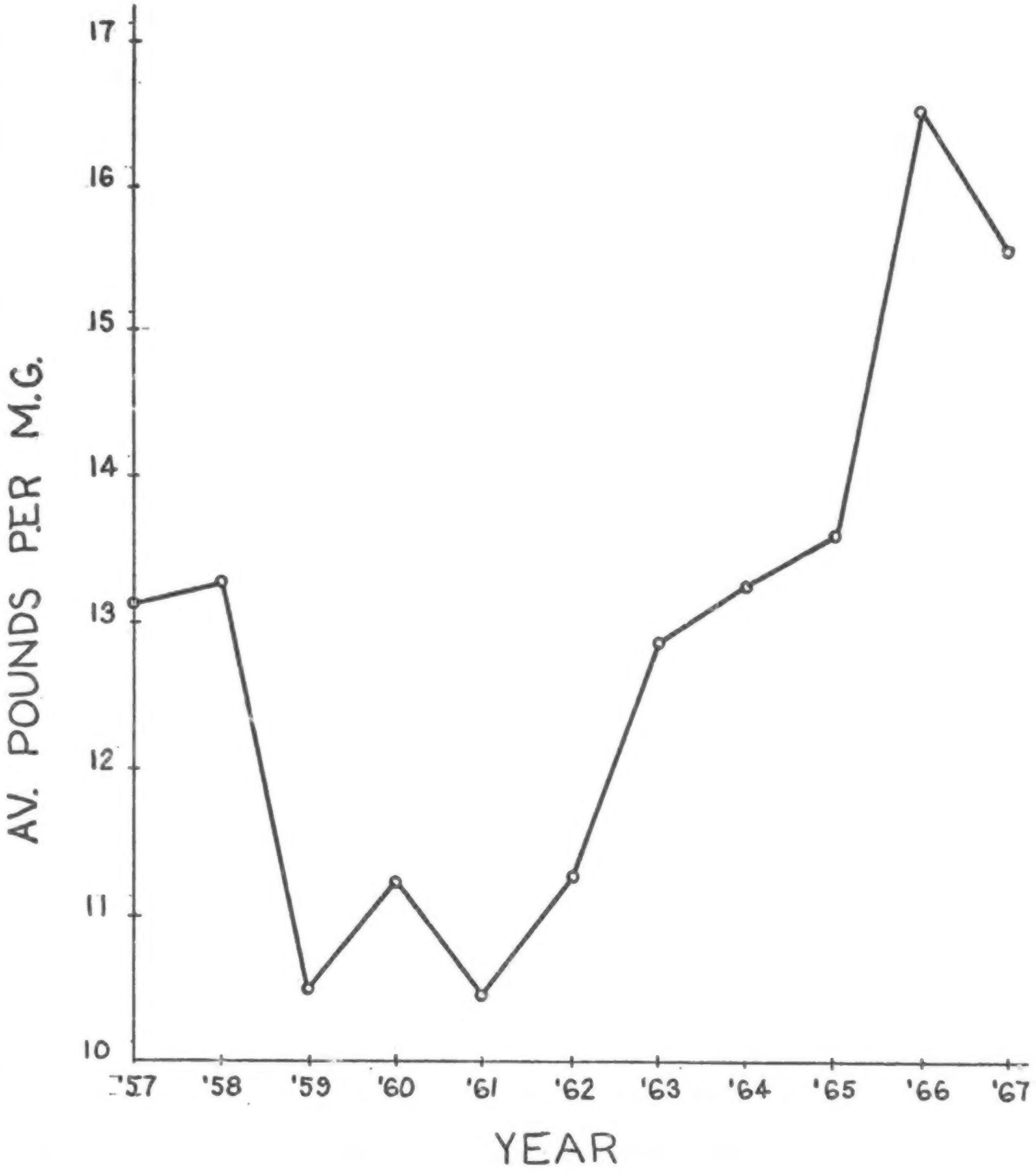


RISE IN CHEMICAL APPLICATION
AT
EVANSTON, ILLINOIS WATER TREATMENT PLANT

CARBON

RISE IN CHEMICAL APPLICATION
AT
EVANSTON, ILLINOIS WATER TREATMENT PLANT

CHLORINE



MR. STEIN: At this point, I would like to make an observation.

Evidently the statement of Mr. Frye confirms Mr. Vaughn's statement on the increase in cost. I don't know, maybe the cities of Illinois are not on the lucky side of the lake, and the Michigan cities may be luckier.

Except you raise another question, and this is the Cladophora or the algal growth. Abner Mikva came up, and he said he had a summer place in Michigan and for the first time he saw the algal growth on the Michigan side. And I think from Dr. Baumgartner's testimony, if I understood it and read it correctly, any effect on one side of the lake is going to affect the other.

So this is a point that the Conferees might consider. I don't see that boundary line we have there being anything other than an imaginary line drawn by man.

Are there any other comments?

(No response.)

MR. STEIN: If not, would you continue, Doctor.

DR. ALLAN FILEK

DR. FILEK: Thank you. I will preface my remarks by saying that the next portion of our report is obtained from our staff as well as that from the Department of Parks and Recreation of the City of Evanston through its Director, Tom Carlson, and his assistant, Don Heaps.

LAKE MICHIGAN FOUR STATE CONFERENCE
FROM EVANSTON-NORTH SHORE HEALTH DEPARTMENT
January 25, 1968

The beach area that is the Evanston-North Shore jurisdiction, which includes Evanston, Kenilworth, Glencoe and Winnetka, covers approximately nine miles of shoreline and is used almost exclusively for bathing, sunning, swimming and boating.

Beach water samples from 11 public beaches were analyzed weekly, using the membrane filter technique by the Health Department Laboratory. Analysis was for total coliform, fecal coliform and fecal streptococcus. The results varied widely at times and although there were no reported cases or other evidence of significant disease arising from bathing in the water at the public beaches, the bacterial counts were sometimes higher than established standards.

A total of eight natural ravines that are fed by storm sewers runoff empty into Lake Michigan. There are six storm sewer outlets emptying into the lake. In addition, Northwestern University has a stormwater sewer system consisting of seven storm sewers located at various intervals along the campus.

The summer of 1967 was an unusual one with a heavy infestation of dead alewives floating to the shore with a resulting health problem of maggots, flies and odors. In some areas this was followed by an influx or, at least, an increase in complaints about rats. Over the last three years, there has been a notable increase in algae in all of the eleven beach areas, with one beach showing an extremely heavy increase.

One result of this contamination of public beaches by decaying dead fish was the loss of summer recreation opportunities for the Evanston-North Shore communities. In addition to the five beach custodians and one sand cleaning machine operator, 50 to 75 percent of the Evanston lifeguard staff of 33 guards received alternate assignments of wielding rakes, shovels, fishing seines and other equipment in an attempt to clean the beaches of dead fish. Only a skeleton staff was kept on lifeguard duty.

It became apparent that the efforts of the normal beach staff was not adequate, as decayed fish, maggots and black flies, along with an unpleasant odor,made the lakefront, including beaches and riprap areas, practically a "no man's land." In Evanston, the personnel of the Forestry Division were assigned to spray heavily every square foot of Evanston's five beach areas with Malathion. Equipment normally used to spray elm trees was employed. Six to ten men worked four to six days to complete this assignment. Six to eight Park Division men were assigned to the lakefront to aid in the raking, collecting in piles, and removing the dead fish from the lakefront. Special wide floatation tires were purchased for a department jeep to enable operation on the soft sand in this fish removal program. These men worked approximately ten days on this assignment. One crew of four men continued working half days by assignment as needed until

Labor Day.

A commercial helicopter spray company was employed to spray all of the Evanston lakefront area, including the beach near the water line and the stone riprap areas twice each week for a three-week emergency period, and then once each week for the balance of the beach season ending on Labor Day.

In the rest of the North Shore areas served by us, we had complaints from private citizens. A helicopter was employed once a week for two weeks to spray all of the beach area and part of the shoreline including not only the public beaches, but private property.

It is impossible to state an overall cost caused by the dead alewives on the beaches during the 1967 season. These costs were both financial and in loss of opportunity for wonderful summer recreation normally afforded at North Shore beaches. In addition to funds expended for summer beach maintenance, the Parks and Recreation Department of Evanston lost heavily from reduced beach revenue, as the public stopped buying season beach tokens. Only a part of the emergency services of

Park and Forestry personnel were charged to beach maintenance.

The 1967 budget for beach maintenance was $2,500. Expenditures for 1967 were estimated at $6,000. The 1967 anticipated beach revenue was $67,866, and actual beach revenue was $56,333. In Evanston, the 1966 beach attendance was 346,583, while 1967 beach attendance was 204,029.

Dead alewives washed onto the Evanston boat ramp areas also resulted in added maintenance costs and in greatly reduced use of the ramps. The 1966 boat ramp registrations totaled 301, and the 1967 registrations totaled 258.

The total beach attendance in the Evanston-North Shore area served by this health jurisdiction was reduced from 680,546 in 1966, to 368,244 in 1967, a 46 percent reduction. Boat launching dropped in the Evanston-North Shore area from 7,046 in 1966 to 5,407 in 1967, a 23 percent reduction.

Attached are the results of sampling of beaches served by the Evanston-North Shore Health Department for 1967 on a weekly basis, and the annual average bacterial results from 1962 through

1967. The high coliform count average for 1967 was that of the Lee Street Beach. This beach also showed the highest average for the six-year analysis, although other beaches exceeded counts at this beach in other years, e.g., Greenwood and Clark Street beaches.

LAKE POLLUTION

Our Evanston Board of Health and our North Shore Municipalities Advisory Health Council, not to mention other local citizens, are quite concerned about lake pollution, especially beach pollution. They have asked for a stepped-up program of surveillance which involves our sanitation and laboratory divisions. We hear that the State is adding or has added men to its staff, indicating their concern also. We believe there is a need for cooperation and coordination in order to avoid duplication. This is a two-way street. We would like to suggest that the involved parties get together to work out a plan, so man-hours can be saved and yet get the job done that needs doing in this connection.

These communities also seem to think we

are the experts in the field and should be in a position to tell them when our beaches are too polluted for safe bathing. We'd appreciate help in making this determination. Perhaps this is not the group that can give us the answers, but we'd like to apply uniform standards so we don't close our beaches under one set of rules, perhaps our own, when other beaches with counts as high or higher, remain open. So far, we have not been able to correlate bacterial counts with any increase in illnesses such as eye, nose, throat, or ear infections, lung diseases or intestinal tract upsets. We are, however, in the business of prevention, so we do not desire to wait until increases do occur before taking action, but we would like more help in the determinations that need to be made. As I read and interpret present standards, it is impossible to tell when pollution is of such a magnitude that lake water is actually detrimental to health. Possibly we need more research in this area, but until then we would appreciate any help we can get in this area.

Thank you, gentlemen, for this opportunity of making this statement and appearing before you.

EVANSTON-NORTH SHORE HEALTH DEPARTMENT
Division of Environmental Health

Annual Average Bacterial Results of Bathing Beach Samples

	1962	1963	1964	1965	1966	1967	1968	1969	1970
South Blvd. T.C.	1900	810	630	14,000	1,700	84,000			
F.C.	-	-	-	-	32	74			
F.S.	260	40	115	46	24	54			
Lee St. T.C.	1300	530	880	18,000	6,000	156,000			
F.C.	-	-	-	-	63	35			
F.S.	420	39	41	8	12	74			
Greenwood T.C.	960	690	690	39,000	700	30,000			
F.C.	-	-	-	-	16	31			
F.S.	348	37	33	22	11	13			
Clark St. T.C.	800	830	770	32,000	800	31,000			
F.C.	-	-	-	-	86	87			
F.S.	302	16	25	32	60	33			
Lighthouse T.C.	960	870	530	2,800	800	44,000			
F.C.	-	-	-	-	16	45			
F.S.	224	45	30	28	14	25			

Reproduced from best available copy.

EVANSTON-NORTH SHORE HEALTH DEPARTMENT
Division of Environmental Health

Annual Average Bacterial Results of Bathing Beach Samples

		1964	1965	1966	1967	1968	1969
Kenilworth	T.C.	-	5,000	700	24,000		
	F.C.	-	-	30	31		
	F.S.	-	48	31	18		
Elder		-	16,000	2,200	61,000		
		-	-	212	136		
		-	100	100	1,072		
Maple		-	6,700	900	41,000		
		-	-	88	90		
		-	50	29	51		
Lloyd		-	6,100	1,200	53,000		
		-	-	290	114		
		-	42	17	41		
Tower		-	4,400	3,300	44,000		
		-	-	60	83		
		-	104	27	137		
[illegible]		-	12,000	800	43,000		
		-	-	97	95		
		-	44	23	28		

T.C. - Total Coliform F.C. - Fecal Coliform F.S. - Fecal Strep

EVANSTON-NORTH SHORE HEALTH DEPARTMENT
Division of Environmental Health

Bacterial Results of Bathing Beach Samples

1967

	June			July					August				
	12	19	26	3	10	17	24	31	7	14	21	28	Average
S. Blvd. T.C.	9500	TNC	3000	TNC	37,000	18,000	77,000	45,000	770,000	9100	3,300	17,000	84,000
F.C.	< 1	6	< 1	600	20	< 1	72	56	10	8	95	24	74
F.S.	30	10	< 1	110	90	< 1	22	64	250	12	5	52	54
Lee St.	7300	TNC	3000	TNC	300,000	609,000	19,000	89,000	810,000	2300	2000	5200	156,000
	10	36	< 1	55	120	5	60	4	44	< 1	80	12	35
	125	490	10	15	55	10	4	5	40	4	5	28	74
Greenwood	7400	TNC	2000	TNC	184,000	9,400	1000	32,000	84,000	13,500	4,500	4,000	30,000
	< 1	6	< 1	230	< 1	75	6	8	2	< 1	40	10	31
	40	5	< 1	20	35	< 1	2	12	6	5	10	18	13
Clark St.	3700	TNC	10,000	TNC	61,000	163,000	9500	38,000	13,000	96,000	24,000	37,000	31,000
	< 1	22	10	150	240	390	115	16	5	2	80	14	87
	65	60	20	40	10	< 1	15	30	5	26	90	28	33
Lighthouse	2800	TNC	2000	TNC	17,000	26,000	23,000	21,000	380,000	12,000	700	19,000	44,000
	< 1	12	< 1	80	260	15	105	5	< 1	4	40	20	45
	10	10	< 1	50	75	< 1	40	10	6	40	5	50	25

	June			July					August				
	12	19	26	3	10	17	24	31	7	14	21	28	Average
Kenilworth	5700	TNC	25,000	TNC	60,000	11,000	23,000	14,000	25,000	95,000	500	3700	24,000
	20	22	< 1	270	< 1	10	4	4	< 1	6	30	4	31
	20	30	10	55	10	10	6	8	20	44	< 1	6	18
Elder Lane	6,100	TNC	3000	TNC	250,000	134,000	6,900	47,000	29,000	23,000	200	28,000	61,000
	350	280	30	810	20	10	30	30	4	4	60	< 1	136
	80	1300	30	70	320	20	36	56	57	26	< 1	60	1,072
Maple Street	1900	TNC	3000	TNC	100,000	156,000	8,500	76,000	3400	28,000	2,200	12,000	41,000
	35	525	20	300	50	10	8	46	< 1	2	60	22	90
	20	300	< 1	80	60	35	4	54	< 1	22	2	34	52
Lloyd Place	12,700	TNC	2000	TNC	90,000	127,000	22,500	28,000	97,000	35,000	2800	24,000	53,000
	140	215	< 1	600	260	10	20	46	6	8	36	26	114
	160	125	< 1	65	50	20	12	6	12	4	16	26	41
Tower Road	6200	TNC	35,000	TNC	66,000	59,000	8700	43,000	28,000	61,000	2200	21,000	44,000
	470	100	20	270	15	5	8	22	2	14	45	30	83
	15	1500	20	50	5	10	2	14	< 1	5	10	12	137
Park Avenue	1200	TNC	6000	TNC	95,000	44,000	6200	140,000	12,000	6600	300	6,000	43,000
	10	520	10	470	10	15	10	65	2	< 1	8	20	95
	5	160	20	60	20	16	2	30	< 1	4	4	8	28

T.C. - Total Coliform F.C. = Fecal Coliform F.S. - Fecal Strep TNC - Too numerous to count

MR. STEIN: Thank you, Doctor.

Are there any comments or questions?

I think that we got two points, one when you had to put all the lifeguards working on clearing that up, and you just had a skeleton staff on lifeguard duty. I guess they didn't have much to do; there weren't many people coming down.

The other point is something I think we really have to look at. Sometimes I think we meet ourselves coming and going, because I recognize that you had to take heroic measures when you had these alewives on the beach. Surely we have to think of something better. And your description of maggots and dead flies is well taken.

But the control measure of putting a pesticide such as Malathion on a beach area where the runoff is to the lake is suspect, and we are all going to have to come up with something a little better than that, because that certainly isn't the way to clean up pollution.

DR. FILEK: I don't like to take up too much time, Mr. Stein, but I could detail this maggot problem a little bit more if you don't mind.

We had one citizen on the North Shore, I think from Glencoe, call and explain that she couldn't see the trees in her back yard, they were so black with flies. Well, I subtracted a little bit from the statement, but I am sorry I didn't go out with our sanitarian, because when he came back he said that was no exaggeration, you couldn't see the trees for the flies.

MR. STEIN: Thank you.

Mr. Klassen.

MR. KLASSEN: Mr. Chairman, this is a two-page statement that will not be read, merely by title. It is from the Superintendent of the Waukegan Water Utility, and is merely being submitted for the record.

MR. STEIN: This will be inserted in the record at this point without objection as if read.

(Which said statement is as follows:)

WAUKEGAN

COMBINED WATER AND SEWER DEPARTMENT

WAUKEGAN WATER AND SEWER DEPARTMENT
WAUKEGAN, ILLINOIS

January 26, 1968

Mr. C. W. Klassen, Technical Secretary
Illinois State Sanitary Water Board
State Office Building
400 South Spring Street
Springfield, Illinois 62706

Dear Mr. Klassen:

The Waukegan Water Utility welcomes the opportunity to present a few of our observations on Lake Michigan pollution to the Four State Conference. We believe that this Conference will be effective in the creation of additional protective measures against pollution of the lake. It is regretful that proper steps to abate lake pollution were not instituted thirty years ago when the problems were not as complicated or as widespread as today.

At the present time, Waukegan depends entirely upon Lake Michigan for its source of water supply. It is certain that in the future, even greater volumes of water will be required for our growing industrial area. For this reason it is imperative that this source of water supply remain relatively free from all types of contamination, so as to protect the health and safety of our future citizens.

From water analysis made at our laboratory during the past 38 years it appears that there is an increase in the rate of decay of Lake Michigan, in our area. There has been a noticeable increase in chlorides, soluble organic materials and chlorine demand of the raw lake water. In addition, new chemicals such as phosphates, certain heavy metals and others have become evident at times in late years. Our old problems from phenol-like substances and other odor-producing organic compounds still cause complaints from our consumers at times.

Bacteriological contamination, which has caused much concern in past years, has greatly decreased in the last two years. This is due to a more effective and efficient treatment of domestic sewage in our area and the relocation of our intake cribs. In the future, the proposed plans of the North Shore Sanitary District will remove all bacteriological pollution from the lake in our area, except surface runoff water.

At the present time we are preturbed about the future possibility of thermal and

WAUKEGAN WATER AND SEWER DEPARTMENT

radionuclides pollution of Lake Michigan. To our knowledge, this type of contamination is relatively new to the water works profession and there is no way to combat it at our level. We hope that serious consideration will be given to the effects that this type of pollution will have upon the future operation of water treatment plants.

We would suggest that all water treatment personnel in plants using Lake Michigan as a source of supply be given the opportunity to work with and to be a part of the program of cleaning up Lake Michigan.

Yours very truly,
(Signed) L.C. Domke
L. C. Domke, Supt.
Waukegan Water Utility

- - -

MR. KLASSEN: I believe it is public information as reported in the press the past several weeks of the interest of the Chamber of Commerce and Industry in all of the four Lake Michigan States. They had a meeting here in Chicago, as was reported in the press, and we are privileged now to have a brief statement by the Chicago Association of Commerce and Industry, hopefully giving the views of the Chambers of Commerce. This will be presented by Thomas G. Ayers, President of the Chicago Association of Commerce and Industry.

Mr. Ayers.

STATEMENT OF THOMAS G. AYERS
PRESIDENT, CHICAGO ASSOCIATION
OF COMMERCE AND INDUSTRY
and PRESIDENT
COMMONWEALTH EDISON COMPANY
CHICAGO, ILLINOIS

MR. AYERS: Thank you, Mr. Klassen.

I am Thomas G. Ayers, President of Commonwealth Edison Company. On January 12, 1968, Chambers of Commerce representatives from the major cities bordering Lake Michigan, together with manufacturers' associations and other concerned civic and business leaders of the four-State area met with a State water official of one of the four States and a representative from the Department of Interior to consider how they might help in controlling pollution and upgrading the water quality of Lake Michigan.

Toward this end, the meeting considered

(1) nature of the Lake Michigan pollution problem, (2) resources available for municipal and industrial control of pollution, (3) role of the Federal Government in the Lake Michigan pollution problem, (4) role of the States in the solution and control problem, and (5) what each of the four States is now doing to solve the pollution problem.

It was agreed that the group would take a leadership role in effectively developing a water quality program for Lake Michigan that will provide for adequate municipal, industrial, and recreational opportunities.

Also, the following recommendation was agreed upon for presentation at this Four-State Lake Michigan Water Pollution Conference:

> SINCE, (1) Federal law requires the States to submit water quality standards to the U.S. Department of the Interior for approval on or before June 30, 1967, (2) upon arrival the respective States become the enforcement authority for such standards, (3) all of the States bordering Lake

Michigan have submitted a water quality standard program, (4) the programs as submitted by the States have not all yet been approved by the U.S. Department of the Interior and, (5) the four States now have programs and are moving forcefully ahead with compliance schedules.

IT IS RECOMMENDED THAT (1) the Secretary of Interior approve the water quality standards programs that were submitted by the four States bordering Lake Michigan on or before March 1, 1968 and, (2) full opportunity be given between now and December 31, 1972 for the fulfillment of the obligation of each of the States bordering on Lake Michigan to independently and cooperatively implement their programs before any independent action by the Federal Government in this field.

Since the adoption of the foregoing policy recommendation, we now know that the Secretary of Interior has approved the four States' water quality programs as they relate to Lake Michigan.

The following Associations unanimously approved the recommendation:

CHICAGO ASSOCIATION OF COMMERCE AND INDUSTRY
Chicago, Illinois

EAST CHICAGO CHAMBER OF COMMERCE, INC.
East Chicago, Indiana

GARY CHAMBER OF COMMERCE
Gary, Indiana

HIGHLAND PARK CHAMBER OF COMMERCE
Highland Park, Illinois

ILLINOIS STATE CHAMBER OF COMMERCE
Chicago, Illinois

INDIANA MANUFACTURERS ASSOCIATION, INC.
Indianapolis, Indiana

INDIANA STATE CHAMBER OF COMMERCE
Indianapolis, Indiana

KENOSHA CHAMBER OF COMMERCE
Kenosha, Wisconsin

MANITOWOC AREA CHAMBER OF COMMERCE
Manitowoc, Wisconsin

METROPOLITAN MILWAUKEE ASSOCIATION OF COMMERCE
Milwaukee, Wisconsin

MICHIGAN CITY CHAMBER OF COMMERCE
Michigan City, Indiana

THOMAS G. AYERS

MICHIGAN STATE CHAMBER OF COMMERCE
Lansing, Michigan

MUSKEGON AREA DEVELOPMENT COUNCIL
Muskegon, Michigan

RACINE CHAMBER OF COMMERCE
Racine, Wisconsin

This completes my statement.

MR. KLASSEN: Thank you.

MR. STEIN: Thank you, Mr. Ayers. Are there any comments or questions?

Yes.

MR. HOLMER: I would like to hear the second recommendation read again, if I might.

MR. AYERS: Yes. Hand it back to me, please.

MR. STEIN: Yes, that is the key point.

MR. AYERS: The second recommendation, that "full opportunity be given between now and December 31, 1972, for the fulfillment of the obligation of each of the States bordering on Lake Michigan to independently and cooperatively implement their programs before any independent action by the Federal Government in this field."

MR. STEIN: Let me clarify the issue, and I think this is a clear one.

As you know, we had a 2-State Conference on the lower end of Lake Michigan. Three of the four Conferees were in favor of an industrial deadline of December 1968; in Illinois they were talking about June, at the end of June '70.

I understand you are asking for even another six months, is that right?

MR. AYERS: No, as I understand it, the programs of the various States had timetables for accomplishing certain parts of their program, and what we are saying is that we ought to give these States adequate time to go to work now on the programs that have been submitted and that have now been approved, and at the time we met it was rather frustrating because these had been submitted a long time ago and no action had been taken on most of them.

The business community would like to take a leadership role to save our lake along with other groups. You have to know what you are trying to save. Each of the States had worked out a careful program, as we understood it. What we are saying is that they ought to be given adequate time to try and do this before you superimpose a

Federal program on top of it.

MR. STEIN: I think we can all agree with that. But I would like to find out the factual situation in your recommendation. I know Indiana has worked out a careful timetable with the cities and industries, I know Illinois has.

MR. AYERS: That is correct.

MR. STEIN: I know the Sanitary District has. And I think these timetables have been worked out under negotiation with the industries. I know of none of these, at least in these two States--we are not talking about Michigan or Wisconsin now--but I don't know that any of these timetables extend beyond July 1972--or 1970; I am sorry. Now, you want to extend that--

MR. AYERS: No.

MR. STEIN: --a considerably longer time, to the end of '72?

MR. AYERS: No, we were not talking about industry per se in this. We were talking about giving the States an opportunity through '72 or a reasonable period of time in which to get their programs launched. There is nothing magic about the end of 1972. But we are not talking about giving industry any different timetable than that that is already in the State plans.

MR. STEIN: I think I understand what you are saying. Certainly, if we are really talking about giving them a considerable time--

MR. AYERS: That is correct.

MR. STEIN: --the question here in terms of a reasonable time, it would seem to me, does not mean we have to give them until 1972 because someone says so. I am thinking in terms of those industries, States and, by and large, cases in which we have been working intensively in the Federal-State program for the past several years which did not have a date beyond July 1970.

MR. AYERS: That is correct.

MR. STEIN: --or those municipalities for which dates already have been set and agreed to with the States?

MR. AYERS: That is correct. That is correct.

MR. STEIN: Thank you.

Are there any further comments or questions?

(No response.)

MR. STEIN: Thank you very much, Mr. Ayers.

Mr. Klassen.

MR. KLASSEN: One of the agencies in Illinois that we depend on for our basic water information, especially water resources, an agency we are quite proud of, is the Illinois State Water Survey. They have been doing some work experimentally, and at this time the Chief of that State Water Survey in Illinois, Mr. William Ackermann, will present a statement.

Bill.

STATEMENT OF WILLIAM C. ACKERMANN
COUNCIL ON ECONOMIC GROWTH, TECHNOLOGY
AND PUBLIC POLICY OF THE
COMMITTEE ON INSTITUTIONAL COOPERATION
GREAT LAKES REGION

MR. ACKERMANN: Thank you, Mr. Klassen, Mr. Chairman, Conferees, ladies and gentlemen.

My name is William Ackermann, and I am here today reporting briefly for a group of research investigators who have considered research requirements in the Great Lakes Region and in Lake Michigan, including the application of systems analysis and modeling to water quality and pollution.

This activity has been carried out under the Council of Economic Growth, Technology and Public Policy of the Committee on Institutional Cooperation, commonly referred to as CIC, which is composed of the Big Ten universities and the University of Chicago. The investigations have been supported by a grant from the Office of Water Resources Research in the Department of the Interior. This activity has been fully coordinated with the Water Resources Council, the Great Lakes Basin Commission, and relevant Federal and State agencies.

Until now, research related to water resources in Lake Michigan and in the Great Lakes Region has been approached, at least so far as the universities are concerned, primarily by the several disciplines, independently, and with little collaboration and cooperation among the universities in the region. Effective procedures for interuniversity cooperation have now been developed.

Considerations by the CIC group of the water quality systems are briefly summarized here as being of principal interest to the Conference. However, parallel and highly related consideration was also given to water quantity models and to water-related information systems and to a regional economic growth model and to studies of institutions.

The modeling of water quality aspects of Lake Michigan and the Great Lakes will necessarily take more than one form, because of the complex nature of the numerous elements involved within the system. It will be useful to approach the water quality from several points of view.

It was determined initially to try two approaches, a lake model and a sub-lake model. Because of the urgency and magnitude of the problems involved, the relative isolation of Lake Michigan from the other lakes, and the interest of available personnel, it was decided that initially the major effort of research on the water quality system would be directed toward Lake Michigan. It is anticipated that other individuals and universities will develop an interest and become involved in the study of the other lakes.

This opportunity to record briefly and to summarize my somewhat longer statement to this Conference, to register the interest and concern and activities and plans of the major universities in this region is greatly appreciated.

I think, Mr. Chairman, that the Conferees can look forward to an increasing research role and participation by the Big Ten universities in getting at some of the long-range problems related to pollution and to the integration of these pollution problems to other problem aspects of the Great Lakes.

Thank you very much for this opportunity.

MR. STEIN: Thank you for a very comprehensive statement. Without objection, we will put your whole statement in the record as if read.

WILLIAM C. ACKERMANN

MR. ACKERMANN: I would like, if it is permissible, for the entire statement to appear in the record.

MR. STEIN: Right.

(Which said statement is as follows:)

STATEMENT FOR
LAKE MICHIGAN POLLUTION CONFERENCE
BY UNIVERSITIES OF
THE COMMITTEE ON INSTITUTIONAL COOPERATION
CHICAGO, ILLINOIS, JANUARY 31, 1968

My name is William C. Ackermann, and I am reporting for a group of investigators who have considered research requirements in the Great Lakes region including application of systems analysis and modeling to water quality and pollution.

This activity has been carried out under the Council on Economic Growth, Technology and Public Policy of the Committee on Institutional Cooperation (CIC), which is composed of the Big Ten Universities and the University of Chicago. The investigations have been supported by a grant from the Office of Water Resources Research in the Department of the Interior. This activity has been fully coordinated with the Water Resources Council, the Great Lakes Basin Commission, and relevant Federal and State agencies.

It is believed that a brief summary of the above activities and proposed plans for research by the universities of CIC are of interest in the record of this Conference.

Until now research related to water resources in Lake Michigan and in the Great Lakes region has been approached primarily by several disciplines independently and with little collaboration among universities in the region. Effective procedures for interuniversity cooperation have now been developed.

The regional analysis will provide guidance for planners and enable researchers to visualize and relate their individual contributions in the development and management of the entire Great Lakes region. It will also provide a valuable means of communication among the relevant private, local, State, National and international bodies.

A. Guidance for Planners and Program Managers

A comprehensive, systems analysis model treats and interrelates a wide variety of diverse variables. There is no one goal criterion that can be optimized with regard to the Great Lakes region. Instead, there is a mixture of goals and objectives which must be considered. Some of these goals and objectives are complementary and some are incompatible.

A simulation model which considered the many feedbacks and time-related factors would allow the planner to investigate the effects of alternative kinds of policies in order to make a comparison. This is especially important in Lake Michigan and the Great Lakes region where interactions exist between many different policies. This simulation model would allow the planner and administrator to observe over time the behavior of the system subject to his policies and water-use projections. If the water-use projections are developed endogenously, then the planner can test the sensitivity of the assumed relationship between water use and other variables.

A gaming-simulation or role-playing model would allow the planner to be an intimate part of the model and would allow him to make dynamic decisions and to react to the impacts which his decisions have upon the system. It further allows the planner to see the alternatives that are available to him in terms of decision making.

B. Enables Researches to Visualize and Relate Work in the Development and Advancement of the System

A comprehensive, systems analysis model enables researchers in the various disciplines to see where their work fits into the model and also to see the kinds of results they need to make their work compatible with the information needed by the model.

The system-wide analysis would also indicate the weakest areas of the model and then allow researchers to give highest priority in these areas. As results are obtained the model could be reformulated and refined to determine the increasing strength in the areas which are further defined and thus keep the areas of greatest effort always before the researchers and before those who fund research.

C. Provide a Valuable Means of Communication

Communications will be opened between researchers in various disciplines since there must be a multi-discipline approach used in developing a comprehensive, systems model of the Great Lakes region which will require information exchanges uncommon to a region this size. It will also serve to open channels of communication between individuals and groups concerned, because it requires the cooperation of data collectors, researchers, and planners involved to develop the model.

One requirement of a comprehensive systems analysis model is consistent and uniform data for a variable throughout the system. This will require communications among all who are concerned with working on the Great Lakes in order to obtain and report data consistently and uniformly for each research project throughout the system.

There is need to intensively examine the present status of, and future requirements for programs of collection, storage, and retrieval of water and water-related data. This must lead to a rationalization of water information programs which will fulfill the requirements of research, planning, and management programs in the region.

This examination and rationalization of data availability and requirements has two particularly important aspects within the systems analysis and modeling framework of the proposed program of research in the Great Lakes region. First, there is a need to identify present data collection sources, the types of data, when collected, and the form in which it is available. This supply of data, when identified, needs to be evaluated as to its adequacy for future research and information program requirements. Second, present and future data needs should be clarified and proposals for implementing procedures to make this data available and accessible should be outlined. This includes the review of emerging research and management programs and procedures and the determination of their data requirements. This should lead to the establishment of strategies for effective dissemination of information to users in private and public planning and policy making activities as well as research activities.

Teams working on subsystem models will have to be in communication so that the subsystem models can be tied together in order to provide results that can be used to determine system-wide effects.

The Water Quality System

Considerations by the CIC group of the water quality systems are briefly summarized here as being of principal interest to the Conference. However, parallel and highly related consideration was also given to water quantity models, to water-related information systems, to a regional economic growth model, and to studies of institutions.

The modeling of the water quality aspects of Lake Michigan and the Great Lakes will necessarily take more than one form. Because of the complex nature of the numerous elements involved within the system, it will be useful to approach the water quality system from several points of view. It was determined to initially try two approaches, a lake model and a sub-lake model. The lake-modeling approach is designed to quantify the interrelationship between local areas from a lake-by-lake viewpoint. The sub-lake approach seeks to describe the nature and alternative courses of action that may take place within a localized region or local sector taking into account the effect of neighboring sectors. The two approaches are not separate and the results from the sub-lake model will allow refinement of the lake model and thus the two models will be complementary and must be developed simultaneously.

The objective of the lake model of the water quality system is to describe the water quality by subregions within each of the lakes of the Great Lakes system as a function of water use requirements and the quality of water put into the lake whether it be natural runoff or return from some use. Each subregion is to be chosen so as to be relatively homogeneous in its properties, receive local inputs and provide local withdrawal.

Information on the physical nature of lake currents in each lake and the physical, chemical and biological transformations that accompany the currents in each subregion of the lake must be collected. Also, the transfer functions which apply to the exchange of water and material between subregions must be determined.

The subregion model will complement the lake modeling effort in the water quality system, as well as the economic growth model.

The sub-lake model will complement the lake modeling effort in the water quality system, as well as the economic growth model. The sub-lake model indicates the spacial relationships between the local lake sectors and associated water uses. The uses may be those such as municipal or industrial water supply, cooling water, or recreation. The location, amount and quality of water put into and withdrawn from each of the subregions must be determined. For some uses it will be possible to employ management or treatment controls on the water quality before or after the water is used; other uses will permit only one and still other uses will permit no control measures.

There must be cooperation and exchange of information between the two modeling efforts. The sub-lake model must use the transfer functions between lake subregions and within each subregion that is determined in the lake model. The lake model in turn will require the use of the location, amount and quality of influent and effluent water for each subregion as determined in the sub-lake model

It will be necessary to identify the water uses in each sector along with the limiting levels of water quality associated with each use. After the limits have been established for each quality parameter, studies must be conducted to determine the types of water and waste treatment methods, management control measures, enforcement policies, etc., that may be employed to control the level of water quality within the limited range for the local sector. The lake model will then integrate these sub-lake models to determine their interdependence and effect on the entire lake.

A series of studies of the costs and benefits associated with controlling the level of water quality in selected local sectors should be undertaken to evaluate the direct costs and benefits which are normally identified as well as to make professional estimates of those social values which usually escape quantification. Then with the comprehensive assessment of the resources available, the use of demands, ideal and practical institutional and legal constraints, and the interactions of the components of the system, alternative control procedures can be suggested to control and manage the water quality to meet selected social goals.

Because of the urgency and magnitude of the problems involved, the relative isolation of the lake from the other lakes, and the interest of available personnel it was decided that initially the major effort on the water quality system would be directed toward Lake Michigan. It is anticipated that other individuals and universities will develop an interest and become involved in the study of the other lakes.

It was further determined that both

subsystem models, whether done system-wide or subregionally would have political, social and institutional characteristics that need to be considered for research activities.

This opportunity to record briefly the interest, concern, activities, and plans of major universities in the region is greatly appreciated.

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MR. STEIN: Are there any comments or questions?

MR. MITCHELL: Mr. Chairman.

MR. STEIN: Yes.

MR. MITCHELL: Bill, in your planning of what research you do, how are you coordinating this with respective States, governments and the Federal Government as to what is needed in research as you set up these models?

MR. ACKERMANN: Well, for one thing, of course, these university people, many of them, but varying at the different universities, have been involved in this research for a long time. I think the leading universities in the Middle West that have been concerned have been the University of Michigan and the University of Wisconsin, including its branch at Milwaukee, with lesser activities at the other schools. One of our activities is to coordinate the on-going affairs of these universities and others.

Of course we read the newspapers, we are watching this Conference with great interest. People like ourselves, some of us wear more than one hat. I have been participating as the Chairman of this Big Ten universities research group, but I am also a University of Illinois professor and I am also Administrator of the Illinois Department of Water Resources, so that we have many lines of communication. We are trying to bring these together to focus on the most urgent problems.

I hope this has been somewhat of a response to your question, Mr. Mitchell.

MR. STEIN: Are there any further comments or questions?

I take it you are talking in terms not of a real physical model of the lake, but one of these computerized mathematical conceptual operations?

MR. ACKERMANN: Yes, that is right, Mr. Stein. While I may not have made this clear, there are many kinds of models. The kind of a model that we are proposing to develop is an analytical model in which the various elements, water quality and quantity, are represented by numbers and the relationships between these various factors of water quality, and so forth, are represented by mathematical equations or functions. And so that we expect to have a very complicated mathematical analytical model of all of the water and water-land-related factors, so that we can simulate mathematically the actual performance of the Great Lakes and its drainage area and its inputs.

MR. STEIN: I know the Conferees will take that to heart. I have seen some of them after hours concentrating on those models in the College Inn.

(Laughter.)

Are there any further questions or comments?

(No response.)

MR. STEIN: If not, Mr. Klassen.

MR. KLASSEN: No, I have no question. I just want to thank Bill.

MR. ACKERMANN: Thank you, Clarence.

MR. KLASSEN: Mr. Chairman, we have heard many, many people in these several days, people with political offices, scientists, pseudo-fishermen like myself--not Mr. Poole, because he is a real fisherman--we have heard a lot of expressions about what is happening to the fish and all this type of interesting talk.

We have tried to find a commercial fisherman who makes his living and has made his living and with somewhat of a reputation to bring to us some real information from the commercial fisherman's standpoint. We have such a man in Illinois, Mr. Mathon Kyritsis, from Waukegan, and he is going to make a short presentation and show a short film.

Mathon, as we call him, has many interests other than fishing, although they all pertain to looking for things in the water. I understand his latest project, and I am serious, when he went to Greece to find the arms of the

Venus de Milo, which has been lost for hundreds of years, but I don't believe he is going to discuss that. I think he is going to bring to us some first-hand statements as a commercial fisherman.

Mr. Kyritsis.

STATEMENT OF MATHON KYRITSIS
OWNER OF MATHON KYRITSIS FISHING COMPANY
WAUKEGAN, ILLINOIS

MR. KYRITSIS: Mr. Chairman, members of the panel.

Thank you very much, Mr. Klassen, for that statement you made over the multitude of my sins.

Would they like to see that now so they can see what I am talking about or after my brief statement?

MR. KLASSEN: After your brief statement.

MR. KYRITSIS: Also I would like to mention, Mr. Chairman, that I have briefed the original statement, but the content is still the same.

MATHON KYRITSIS

Commercial fishing in the Great Lakes today practically does not exist. There are two major reasons, the sea lamprey and pollution.

In Lake Michigan the yearly catch amounted to six million pounds up until 1943, but in three years time this dropped to less than one million pounds.

In the late 1940's commercial fishing had just about come to an end. There were at that time over 1,000 commercial fishermen, with fishing boats, employing about 40,000 persons. In Waukegan alone there were 17 boats employing about 200 people. Today there are only two and four people are working today.

But this did not happen overnight. It came about over a long period of time and many things contributed to the demise of the commercial fishing.

Seventy-five years ago the lake was full of grayling. They spawned in the Muskegon River at the time the lumbermen were using the rivers to float their logs to the mill so they could save a little time.

The logs in the river prevented the

fish from reaching their spawning grounds. They died by the thousands. Farmers in the area carted them away by the truckload to use them for fertilizer. Today there is not one left in the lake.

Next to go were the sturgeon. Fishermen did not know the value of the fish. All they knew, that it was big and they were ripping their nets. And in 1880 four million pounds were buried on the lakeshore or left there to rot.

Commercial fishermen then discovered that they were tasty when smoked and caviar was made from their eggs, but it was too late. Today it would take another Diogenes with his lantern to find one.

Then came the end of the lake trout. For instance, in Waukegon, which used to be one of the largest fishing ports on Lake Michigan, they reported catches of almost 1,200,000 pounds in 1943. In a very short time it dropped to 275,000 pounds.

And in 1950, when the members of the Lake Michigan Fish Protection Commission came to Waukegan and were taken fishing, six trout were caught, five of them scarred by the sea lamprey.

The main cause of this drop was, of course, the sea lamprey, but over 100 years ago we had a warning about this fish killer from Dr. G. Kirkland, one of Ohio's foremost naturalists, who predicted that the opening of the Welland Canal would bring the sea lamprey into the area. Before that time it was locked in by Niagara Falls, but the canal provided the entry into the other Great Lakes.

So you see, progress is one of the reasons for the decline of the fishing industry. We took one step ahead and it turned out to be two steps backwards.

But the sea lamprey wasn't the only killer of the fishing industry. Pollution began many years ago when the old steam boats dropped their coal cinders into the lake over the spawning grounds of the lake trout.

The trout prefers a honeycomb surface to lay its eggs. It couldn't distinguish the cinders were not the spawning grounds. If the current was favorable, the eggs had a good chance to hatch, but if not, the cinders were churned up by the current and the eggs were destroyed.

Oil from pleasure boats and other carriers also contributed to the end of the trout and the whitefish. The oil formed a film over the eggs and not only added to the pollution of the water but also choked off the oxygen supply to the eggs and killed the spawning grounds.

With the passing of the trout came the population explosion of the alewife, which came to the Great Lakes by the same path that the sea lamprey came. While the trout were plentiful the alewives were kept under control because they became food for the trout.

Last year millions of pounds of alewives were washed up on shore. This year the same thing is expected. One way to overcome this would be for the government to put trawlers into the lake to remove them before they die. Then they could be used for fertilizer to serve some useful purpose.

Up to now the government hasn't really helped the Great Lakes fishing industry too much. Our government, which has contributed so much to other countries, such as $15 million to Japan, $26 million to Germany and to many other countries to restore their fisheries, should not hesitate to spend any amount necessary to control pollution, the sea lamprey and the alewives.

No other natural resource measures up to the Great Lakes. If we destroy them, we will never be able to replace these majestic bodies of water. The elimination of pollution is necessary to restore the lake to its previous healthy state.

I have fished the lake for 47 years and have seen it gradually go down hill because no action was taken by groups that would have been interested in its preservation.

A great number of persons have used the lake as a personal dumping ground. They did not realize that they were helping to kill off an industry, that it was the home of the fish that we eat, we use for food, and the water that we drink.

I know there are no easy answers to the problem of pollution, but I believe a Nation that was able to split an atom will be able to find a solution to the pollution, to the sea lamprey and the population of the alewife if they care to.

Thank you.

MR. STEIN: Thank you very much, sir.

Are there any comments or questions? Did you want to show your film now?

MR. KYRITSIS: Yes. And I will explain first that this is the sea lamprey film that I took with me out to Washington when I appeared before the Merchant Marine and Fisheries way back in 1949, and that was instrumental in getting the first appropriation of $450,000 and also the creation of the Great Lakes Fishery Commission, for which I am an adviser.

MR. KLASSEN: I think, Mr. Chairman, one of the justifications for the time on this sea lamprey film is the fact that in many peoples' minds all of the fishing in Lake Michigan has been ruined due to pollution. This, of course, is not the case, and I think that this speaker wanted to show--and it is a very short film--that there are other factors that have affected the fish in Lake Michigan besides pollution.

MR. STEIN: About how long will the film run?

MR. KYRITSIS: About three minutes, sir.

MR. STEIN: Right.

(Which said film is marked Exhibit 8, 2/5/68, and is on file at the Federal Water Pollution Control Administration office in Washington, D.C., with a copy on file at the Regional Office of the FWPCA in Chicago, Illinois.)

MR. KYRITSIS: This is a picture that was taken of the aquarium which I have in my place and shows the lamprey. Now, this is one of the largest lampreys I have ever seen. It is about three feet long. As you can see, their mouth has hundreds of little things that hold onto the fish and with the pointed tongue it pierces through the skin of the trout--they prefer the trout because it doesn't have so many scales--and absorbs the life out of this fish.

Now, the lamprey, the original, we don't really know where the lamprey came from, but it appears it came from the Atlantic Ocean, and because of its spawning habits it came through the St. Lawrence and up to Lake Ontario and became land locked. As I stated before, the Niagara Falls prevented the sea lamprey from coming farther west until way back in 1928, they began to build the Welland Canal and then, of course, enlarging it in other years made it possible for this lamprey to come in, because they not only attach to fish but they also attach themselves to the passing steamers, including human beings, which in many cases you have heard that a lamprey has attacked a human being.

There is a fish that you will see in there in a few minutes that actually has been killed by the lamprey, because too many people don't really believe that a lamprey will be such a killer.

Mr. Operator, you can go a little faster, if you want to.

What you see in there now are the lake smelts, which also have been introduced to the Great Lakes. They were introduced way back in 1906 when the Conservation Department of Michigan tried to introduce the salmon. They never succeeded, but the smelt increased to the great numbers which they are today.

You see this here were the lamprey and the lake trout. The next morning I went to the restaurant there was nothing left.

Now, there is the lamprey attached to a sun fish, or I don't know exactly what the fish is, I can't see from here, but you will see in just a very short time that the lamprey will kill this fish. And I thought I will bring this film because many members of this Board or the audience and the press have never seen anything like that before.

In the beginning, the government tried to prevent the lamprey going up the stream, because they have to go up in the stream as far as 8 and 10 miles to spawn. They look for a ground, and after they spawn, they lay about 65,000 eggs, the young ones after they hatch bury themselves in the mud and they stay there for 5 or 6 years. At the end of that period metamorphosis takes place and the lamprey go down in the lake and begin to do what they are doing right there, killing the lake trout.

That is the end. Thank you, sir. You can turn it off it you wish now.

MR. STEIN: Thank you, Mr. Kyritsis.

Are there any comments or questions?

Those films were very interesting and I enjoyed them. By the way, where do all the Great Lakes whitefish come from that we get in the restaurants?

MR. KYRITSIS: Mostly they come from up in Lake Superior, but recently we have started getting them on Washington Island and also on the other side of Lake Michigan.

On this side, on the east side of our Lake Michigan, it seems to me that pollution is too much. You see, whitefish will spawn in 20 foot water and then the young ones will move to about 3 feet of water, you see, but now because of the pollution they are not able to come so close. That is why the only place you get them is up at Washington Island.

MR. STEIN: In case you think we are alone, you know, I read an item in the paper the other day that the pollution was also affecting the Russian sturgeon and a serious threat to their caviar industry.

MR. KYRITSIS: In Russia?

MR. STEIN: Yes.

MR. KYRITSIS: It isn't true.

MR. STEIN: What?

MR. KYRITSIS: I could say this--that in 1880, and I have the records of the Congressional Record of this, the Romanoff importing industry, they shipped about 30 barrels of eggs from here, from the Great Lakes, to Russia and after they were processed, some of them were sold in Europe and the other came right here. And I think, you know, there was a very good thing that the Russians did when they sold the caviar thinking that it came from the Caspian Sea.

MR. STEIN: Let's get this off the record.

(Off the record.)

MR. STEIN: Let's get back on the record.

Thank you very much.

(Applause.)

MR. KLASSEN: Mr. Chairman, we have a number of short presentations here.

I want to recognize Representative Daniel Pierce, of Highland Park. He stated he just wanted to put his statement into the record and will not speak.

Representative Pierce.

MR. STEIN: That statement will appear in the record as if read without objection.

(Which said statement is as follows:)

STATEMENT BY
THE HONORABLE DANIEL M. PIERCE (D-32nd)
STATE REPRESENTATIVE
TO FOUR-STATE LAKE MICHIGAN POLLUTION CONFERENCE
CALLED BY SECRETARY OF THE INTERIOR
Sherman House, Chicago, Illinois
January 31, 1968

The citizens of Lake County, Illinois are very pleased that the United States Department of Interior has recognized the pollution danger to our dying Lake Michigan to be America's most serious pollution problem. The calling of this Four-State Conference by Secretary of the Interior Stewart Udall, at the request of Governor Otto Kerner, is the first step in bringing Michigan, Indiana, Illinois and Wisconsin together to save Lake Michigan before it is too late. It evidences the determination of the Federal and State Governments to solve the problem.

In my town of Highland Park, we have long been aware of the dangerous pollution produced by the three primary sewage treatment plants operated on our City's lakefront, adjacent to beaches and water intakes, by the North Shore Sanitary District. The North Shore Sanitary District also maintains primary sewage treatment plants on Lake Michigan in the City of Lake Forest and Village of Lake Bluff, which lie within my legislative district. The effluent from all five of these domestic sewage plants flow directly into the lake after receiving only outmoded primary treatment. We are also aware that the secondary sewage treatment plants maintained by the North Shore Sanitary District at Waukegan and North Chicago, as well as those operated by the Defense Department at Great Lakes Naval Training Center and Fort Sheridan, are to a somewhat lesser extent polluting Lake Michigan by depositing nutrient and encouraging the growth of algae.

The North Shore Sanitary District has recently decided, on the recommendation of the Illinois State Sanitary Water Board to close all seven of its lakefront sewage treatment plants and to divert sewage away from Lake Michigan westward to the Des Plaines River. This could not be done in the past because of uncertainly

REPRESENTATIVE DANIEL M. PIERCE

over the diversion suit brought by our sister Great Lakes States against the State of Illinois in the United States Supreme Court. The Supreme Court had limited diversion from Lake Michigan in the State of Illinois to 3,200 cubic feet per second as measured at Lockport, the full amount used by the Metropolitan Sanitary District of Greater Chicago.

In order to remedy this situation, the North Shore Sanitary District has proposed a bond issue of some $37 million to be paid from real estate taxes within its boundaries. The total cost of closing all the lakefront plants is estimated to be approximately $60 million. It can thus be seen that substantial Federal and State financial help will be required if the project is to be completed. In addition, the real estate taxpayers within the North Shore Sanitary District, mostly home owners, are faced with many rate increases and bond referenda proposed by local elementary and high school districts, as well as by the new Lake County Junior College District.

In view of the fact that our number one

National water pollution problem is the accelerating deterioration of Lake Michigan as a living body of water, it would seem appropriate that substantial Federal and State financial assistance be provided to aid the North Shore Sanitary District in ending Lake Michigan pollution from domestic sewage in Lake County, Illinois.

Lake Michigan is an invaluable National asset. It is the source of public water supply for millions of people. It provides recreation for boating and swimming. It is our transportation artery tying the Midwest with the world. It is much more vital than the Tennessee River on which the United States Government has spent many hundreds of millions of dollars over the past three decades.

I therefore request that the Federal Government and the four States bordering the lake declare the pollution threat to Lake Michigan to be a National emergency. Federal and State funds in an amount necessary to do the job should be appropriated on an emergency basis to save our lake. The job is too big to be financed by local real estate taxpayers whose homes are already bearing the burden of education and local government.

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MR. KLASSEN: Some of these people I am not sure that they--I have tried to check whether they are back today.

The Village Manager of Winnetka, Lee Ellis, is he here?

(No response.)

MR. KLASSEN: Apparently not.

(The Ellis statement is as follows:)

STATEMENT DELIVERED TO
LAKE MICHIGAN FOUR-STATE POLLUTION CONFERENCE
January 31 - February 6, 1968 by
L. A. Ellis, Village Manager
Village of Winnetka, Illinois

As a public official of a municipality which abuts Lake Michigan, I share all of the concerns about pollution expressed by other officials in attendance at this Conference. I come not to document the obvious pollution problems, but rather to make a plea for scientific research in the field of water sampling and testing.

Responsible and responsive public officials at the local level who have the task of operating public beaches need to know the quality of the lake water at their respective beaches. Today's tests for bacteria counts require the passage of 24 hours' time before the results of the test can be known. Some tests require even more time. The consequences attendant to such delays are quite apparent. We are able to tell our residents that the lake was (or was not) polluted to a dangerous level yesterday or the day before. But what about today? You well know that shifts can occur rather rapidly in the water adjacent to a beach. What was acceptable quality water this morning, may be dangerously polluted this afternoon. Our residents and users of the beaches should be alerted to dangers in the quality of water at public beaches. If you are not yet ready to abandon the use of Lake Michigan for public swimming, then you must be concerned about development of better testing procedures.

Upon reflection one can understand that a sampling and testing technique capable of

VILLAGE OF WINNETKA, ILLINOIS

producing quickly a broad-band indication of water quality has almost unlimited applications. We tend to believe there is a very large potential market for such a product--not only around the Great Lakes, nor even limited to this country. Why then has not such a product been developed? From our lay position we can only guess at an answer, but we suspect that considerable expensive research would necessarily be involved. If this is true, then we need someone to give impetus to this research and that is why I am here today.

I would recommend that from this Conference some direction could flow which would officially recognize the value of a quick-acting broad-band indicator and, further, that this Conference could set in motion appeals for grants to research organizations for the development of such a product. If sufficient stimulus is provided I have enough confidence in the technical resources of this country to believe that this new product can be produced. The stimulus--in the form of a research grant--could come from numerous sources. Because of the scope of the problem we tend to believe that it would be appropriate for one or more of the States, the U. S. Public Health Service, or some other Federal establishment to address itself to this facet of the problem. Although we must certainly attack the sources of pollution and bend every effort toward improving the quality of lake water, we should not ignore the fact that we must live with pollution from now until that day when we will have abated it once and for all. I suggest that the time span from now until Utopia is sufficiently long to warrant a substantial investment in the production of a broad-band, quick acting indicator of pollution for the use of public officials charged with the responsibility of operating public beaches on Lake Michigan.

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MR. KLASSEN: The statement by the Illinois Boating Association I understand will be given by Gerhard Schemel.

Yes, sir.

We have two statements from the Boating Association. This is one and there will be another one. I think it will be of particular interest, the boaters' viewpoints, especially in connection with the Chicago ordinance for watercraft pollution.

Are you going to present the statement or do you just want it for the record?

MR. SCHEMEL: I want to read it, please.

MR. KLASSEN: All right.

STATEMENT BY GERHARD M. SCHEMEL COMMODORE OF THE LAKE MICHIGAN YACHTING ASSOCIATION FOR THE ILLINOIS BOATING ASSOCIATION

MR. SCHEMEL: Mr. Chairman, distinguished Conferees, ladies and gentlemen.

My name is Gerhard Schemel and I am Commodore of the Lake Michigan Yachting Association.

The Lake Michigan Yachting Association is composed of all the boat clubs of any consequence on the shores and tributaries of Lake Michigan. There are 82 clubs enrolled with a total membership in the four-State area, upwards of 15,000 members. I also speak for the Illinois Boating Association which represents about 10,000 boaters in the State of Illinois.

GERHARD M. SCHEMEL

As a professional airline pilot, I have, during the past 23 years, flown across Lake Michigan more times than I can remember. The crossing altitudes ranged from 2,500 feet in the old DC3's to 41,000 feet in the modern jet. Being an inveterate boater, these crossings have given me an excellent opportunity to observe our lake.

Gentlemen, it is appalling to watch huge rivers of pollutants coming out of streams, rivers, municipal and industrial complexes and see them stretch for miles into the lake and along the shoreline and the beaches. Like myself, boaters have had physical contact with these polluted areas. We have wondered for some time now if anything was ever going to be done about this pollution.

Being more cognizant than the average citizen, it should be obvious that the boating public shares your anxiety about the deteriorating condition of Lake Michigan. I should point out at this time that we as boaters are mindful that our hands are not exactly clean. We are aware that we contribute to pollution but we feel considering the overall pollution picture at present and in the foreseeable future, that the boaters' hands are indeed very small and not very dirty.

As for the littering problem, we feel calling attention to the undesirability of littering and so forth by various legislative bodies, accompanied by good promotional programs by our boating organizations against this repulsive practice should go a long way to minimize littering, and so forth.

In view of the fact that the boater would rather float his boat in drinking water, we wish to commend Mayor Daley, the Chicago City Council, the Federal Water Pollution Control Administration and the Chicago newspapers for spotlighting this problem in the public eye. We have a special commendation for Governor Kerner and Secretary Udall for calling this Conference.

Inasmuch as a good thing is sometimes carried too far, we feel the City of Chicago, with its hastily adopted ordinance for boats and its impossible compliance date, has been overzealous. We do not agree with Chicago that holding tanks are the only way to arrest pollution. This feeling is also shared by those States that permit suitable treatment devices. We are aware that the ordinance states in part:

> "A treatment system utilizing a method of waste treatment approved by the port director and complying with the rules and regulations establishing water quality criteria for Lake Michigan as set by the Illinois Sanitary Water Board may be permissible on vessels, crafts, floats or motor boats operating in harbor water in lieu of retention tanks."

This loosely written ordinance puts the boater in a quandary, because manufacturers are unwilling to go into a field, perhaps only local in nature, to come up with a product for which standards have not been set, and if set and met, there is no assurance of acceptance.

Now that we have accomplished at least a part of our objective, that is, to recognize the problem and start doing something about it, we should at this time, and hopefully through the efforts of this body, re-evaluate the seriousness of the problem, eliminate the atmosphere of pollution hysteria and make sure that we are on the right track.

I would at this time point out that the boaters of Lake Michigan stand ready and willing to solve the pollution problem that may be caused by boats. As boaters and good law-abiding citizens, we would like to be put in the position of being able to obey both the spirit and letter of the law. With the Chicago ordinance heaped on top of all the other nonuniform laws in the Lake Michigan Basin regulating sewage discharge from recreational boats, we find ourselves in a position similar to a sparrow caught in a badminton game. Every time we make a move we get some tail feathers knocked off.

Picture for example, if you will, the racing sailor who wants to compete in the Chicago Mackinac Race. He has a medium-size sailboat carrying a racing crew of 8 to 10 men and he wants to comply with the Chicago ordinance. His quarters below are very cramped indeed, with every available space used for minimum accommodations, and this includes undersized but adequate sanitary facilities. He must plan for the following:

Ten men will use the head for various functions on an average of five times in 24 hours. With a half gallon of water per flushing, we find that we pump 25 gallons per day into the holding tank. (5x10x1/2=25). A 10-day trip will need a 250-gallon tank.

Where is he going to put it? And how is he going to carry it? Two hundred fifty gallons of water weigh one ton. No racing sailor, even if he could, is going to want to load down his boat with that kind of weight. The alternative is to plan a smaller tank, which means he won't be able to compete because of the need of putting into port to have his tank pumped out. If he's fortunate enough to find a facility, he may find that his external fitting, because of a lack of specifications, won't fit the pump-out mechanism, or he may find his tank being pumped into a sewer system which discharges its untreated sewage back into the lake.

There is another alternative, the chamber pot or the portable toilet with disposable plastic bags. We certainly don't want to encourage or force the boater to use these last two methods, because they both contribute to pollution, and the latter also contributes to littering. These plastic bags have a habit of floating around for quite sometime.

The power boater is faced with the same dilemma. He, if he can find room, may install expensive equipment for waste disposal, only to find, like the Coast Guard Tug Arundel, that this is not acceptable and has to be removed or at least modified to meet some nebulous standard.

You might say it's easy to criticize; what do you suggest? It is hoped that when you consider pollution from boats that consideration be given to the new type Chlorinator Macerator device for boat toilets, which includes a requirement for a "fail safe" attachment to prevent discharge when the chlorine supply is exhausted or retention time is shortened. Right now I can see the word "nutrients" in your mind. I have attached to my written statement statistics that will show that the quantity of nutrients from boat toilet waste is negligible, less than one ounce per week per boat by quantitative analysis.

To further highlight that boating

contributes little pollution and/or nutrients, it should also be noted at this time that the Bay View Beach (City of Green Bay) was closed to swimmers many years ago on account of polluted water. I believe you will find that it was also many years before boating became as popular as it is today. Perhaps the swimmers had something to do with this. Swimming is the largest form of water recreation around the lake. Every summer untold thousands use the beaches of Lake Michigan.

Has consideration been given to the possibility of making the bathing water safer and cleaner by forcing bathers to wear leakproof suits and also perhaps rubber pants?

I would also like to depart from the record for just one second and state that additionally Mr. James Vaughn stated this morning that October, December '67 and January '68 were extreme months for his department. We all know that swimmers and boaters are completely absent during those months.

As it stands now, the new type of Chlorinator Macerator device effectively destroys all bacteria and discharges a liquid that is cleaner bacteriologically than the water taken in for flushing.

Inasmuch as chemical treatment devices are already advanced to the point where they can remove most of the chemical nutrients, I have confidence in American ingenuity and industrial know-how, that being given the go-ahead in the form of standards to be met for water quality, an effective chemical treatment device for boat toilets is just around the corner. A satisfactory device could then be installed by the boat owner at no cost to the taxpayer, and it would eliminate the need for expensive shore installations.

It is hoped that this body will give serious consideration and recommend to the various States the Model Act to Prohibit Littering and the Disposal of Untreated Sewage from Boats as promulgated by the National Association of State Boating Law Administrators. We also recommend for your consideration the Uniform Performance Standards and Testing Procedures for Watercraft Waste Treatment Devices, developed by the National Sanitation Foundation.

GERHARD M. SCHEMEL

When it comes to compliance dates, we question the reasoning and justice which allows governmental agencies to have approved schedules for completion as far away as July 1977, a total of nine years, industry is given in some instances until December 31, 1968, one year, and boaters until May 15, 1968, a mere three and a half months. Eight large vessels in Lake Michigan are operated by government services with crew complements as high as 185 men, all without any waste treatment devices. They are merely planning to develop adequate treatment devices as soon as possible or as soon as funds permit.

What is the compliance date for as soon as possible? The FWPCA recommends that: "Waste treatment for the following industries, 115 to be exact, to be determined within six months of the issuance of the Conference summary and construction of necessary facilities to be completed within 36 months."

The U. S. Government has established project priorities on the basis of the severity of the pollution problem. We feel this is commendable. When it comes to the boater, the one with the little problem, this procedure is reversed. Why does the Chicago ordinance require that the boater be the first to comply? Is it because it is easier to hit the little sparrow instead of the lofty and powerful eagles?

In conclusion, we would like to reiterate that we are ready to stop discharging raw sewage and littering. In order that we may accomplish this we ask for a workable pollution abatement program, uniform State laws, hopefully patterned after the National Association of State Boating Law Administrators model legislation, and reasonable time to comply with these laws and simultaneous deadlines for compliance.

Until such time as these suggested programs and laws can be promulgated, we ask for a delay in the enforcement of Federal, State and local laws that deal specifically with boat pollution.

On behalf of all the Lake Michigan Yachting Association and Illinois Boating Association members, I wish to express our appreciation for being given this opportunity to express our views and opinions.

I thank you.

(The following material was submitted by Mr. Schemel:)

QUANTITY OF NUTRIENTS FROM BOAT TOILET WASTES IS NEGLIGIBLE

STATISTICS

1,500 boats with toilets in all Chicago harbors

10 percent occupied on week days - 1 BM, 4 UR per boat

25 percent occupied on holidays - 2 BMS, 7 URS per boat

Weekday BM = 1500/10 x 5 - 750 BMS

Saturday and Sunday = 1500/4 x 2 x 2 - 1500 BMS

Total BMS per week = 2250 (80 percent water)

*Nitrate NO_3 in 24 hours, on basis of 1 gm. nitrogen = 4.4 gms

*Phosphate PO_4 in 24 hours, on basis of .242 gms. phosphorus = .726 gms.

Total nitruent per 24 hours BMS = 5.12 gms.

Average 2 BMS per 24 hours = 2.56 gms per boat

Total nutrient per week = 2.56 x 2250 = 5760 gms.

At 454 gms. to a pound , 5760 gms. = 12.6 pounds.

Weekday URS 1500/10 x 4 x 5 = 3000 URS

Saturday and Sunday URS = 1500/4 x 7 x 2 = 5250 URS

Total URS per week = 8250 (95 percent water)

**Ammonia nitrogen NH_2 in 24 URS = 25 gms.

Average 8 URS per 24 hours, each UR = 3 gms.

Total ammonia nitrogen per week = 3 x 8250 = 24750 gms.

At 454 gms. to a pound , 24750 gms. = 54.51 pounds.

Total nutrients per week = 12.6 plus 54.51 = 67.11 pounds.

Acreage covered by harbor water about 2000 acres.

Water content of all harbors about 5 billion gallons.

Average contribution per boat per week = 67.11/1500 = .045 pound or 3/4 ounce.

*Backus, Gastro Enterology, Vol. II. pp. 717-719

**Geigy, Synopsis of Urine: Geigy, Pharmaceutical Scientific Tables, p. 528

**Horwitz, Biochemistry, p. 175

**White, Howeler & Smith, Biochemistry

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MR. STEIN: Are there any comments or questions?

Mr. Mitchell.

MR. MITCHELL: What does the NASBLA model legislation say?

MR. SCHEMEL: Sir, I believe that Mr.

Ron Stone, from the Outboard Boating Club of America, a manufacturers' organization, perhaps--

Is he going to follow me onto the rostrum?

MR. KLASSEN: He will. We are going to have about a three-minute presentation from the Illinois Federation of Sportsmen's Clubs next and then Ron Stone is going to follow him this morning.

MR. SCHEMEL: Ron Stone in his presentation will provide you gentlemen one copy of the National Association of Boating Law Administrators Model Legislation and also the report by the National Sanitation Foundation of Ann Arbor, Michigan, on their treatment devices, and so forth and so on. This is one reason I don't have it included in mine.

MR. STEIN: Sir, I have probably been in the forefront of some of this because out of enforcement funds we investigated the advantages of the macerator chlorinator device on the Great Lakes. We found two things, though.

One, that when there was a peak load-- and we use them on Coast Guard ships and all the boys hit the head at the same time as in a hotel or anywhere else--they weren't able to handle the peak load, and where do you put the water with the so-called failsafe devices?

The other problem that we found with these devices was they do not remove the nutrients, and we are dealing with a nutrient problem in the Great Lakes.

Now, I don't think there are any scientific indications that in the future we are going to be able to remove nutrients without providing a sludge residue that has to be discharged. The question whether this can be made applicable to a shipboard installation is problematical.

MR. SCHEMEL: It is my understanding, starting with your last question first, that there was a report here several days ago by a Dr. Weinert, or something like that--

MR. STEIN: Weinberger.

MR. SCHEMEL: --who indicated that the state of the art is so advanced now that they can take 85 to 95 percent of the phosphates, and so forth, out at the present time, and I think that--

MR. STEIN: Yes. But again I think--just approach this with an open mind--they take this out with some kind of settling or flocculation process. If you think you are going to have a problem with that yacht with 250 gallons of water, think of the problem you are going to have with the sludge on your boat.

MR. SCHEMEL: Well, yes, sir, I am perfectly well aware of it.

And answering your question as to the failsafe device, according to the facilities, the failsafe device shuts the unit down if the chlorine runs out or if the peak loads are in excess of the retention time so that the unit is not usable.

Now, the question you say, what do you do with the water? What does the gentleman with the holding tank do when it is full?

MR. STEIN: Presumably the holding tank is going to be designed large enough for his run before it is full.

MR. SCHEMEL: Well, sir--

MR. STEIN: And the question here we always have with the question of the head and the macerator chlorinator is to get a device that is small enough to fit on a small boat and yet within the capability of the man to pay.

Now, I know this is a complicated arrangement. In looking at this and the Chicago operation, and as some of the big corporations or big cities can attest, I would say as far as our record shows we deal with big polluters and small polluters equally--not sparrows or eagles. The point is we deal with the small ones with an even hand just as we deal with the big ones.

The problem that I have, sir, is really this, and I am a little surprised at boaters. No matter who the polluter is or what kind of a polluter we have--an industrial polluter, another kind of polluter, a municipal polluter or very often a Federal agency polluting, and now the boating polluter--it comes out to the same thing: "We have an alternate device."

"You are asking us to do something too fast."

"Why don't you give us as long as the

next man?"

"And until such time as these suggested programs and laws can be promulgated, we ask for a delay in the enforcement of Federal, State and local laws that deal specifically with boat pollution."

I recognize the validity of this comment or what you are saying, but we just heard the manufacturers' representative here. He asked for the end of '72 before we do that.

In other words, it all boils down to the same thing. Anyone who is throwing something in the lake feels we are moving too fast too soon and we are requiring too much when we are asking them to do something.

MR. SCHEMEL: Well, sir, I don't feel that the boaters feel the same way--that we feel that you people are moving too fast or that we are requesting an extension of time. The main reference that I would like to make is the Chicago ordinance has put the Chicago boater in a very untenable position where it is physically impossible for him to comply with the ordinance for the simple reason that a lot of boats cannot install holding tanks in their boats and even the--which is the approved, the recirculatory system has a five-gallon capacity for the large one, which is a definite hazard for sailboats when they lean over. It should be readily apparent that holding tanks are a real problem as far as installation is concerned in the small boat.

I might like to point out, you used a reference of yacht; I have used boaters. The very, very large majority of our people are bricklayers, carpenters, shopkeepers and middle income people who do not have yachts. We don't call our boats yachts anymore, we call them boats, this is what they are.

And I would like to point out at this time, and this is where I would like to deviate from the recommendation, is that I think there is a definite class and need for a separation of the small 25-, 30- or 40-footer from the oceanliner who has unlimited capacity for complying. Hospital ships, for example, and Great Lakes steamers, six and seven hundred footers, we are put in the same category and we don't have the facility or room.

All we are asking for, if I may repeat, is a reasonable time so that we can comply with the ordinance. We would like uniform regulations so that we can go from Chicago to Michigan and have our facilities accepted and have the Michigan boater come to Chicago and have his facilities accepted. This is all we are asking for.

We realize that we pollute; we want to stop it; and we would like your help in helping us to do it.

MR. STEIN: Yes.

I don't want to prolong this because I think we need a lot of discussion. But, again, don't adopt this notion that you are in a special category or a big boat or a big industry has any more space to comply. Right through the Public Health Service for many years I have worked with boats, particularly passenger boats or war ships, and if you begin to look for an inch of space on one of these ships and try to gather those pipes together, you will find a problem that is as complex as any you will find on a small boat.

Now, again, and I don't have any brief

for a big industry, but if you think that the U. S. Steel South Works plant, that big U. S. Steel plant in Chicago, can more readily find the space for its waste disposal facilities and collection facilities in its plant than you can find on a small boat and they have easier problems, I think we are kidding ourselves. If we are going to clean up pollution we all have to make this effort and we have to make this sacrifice. I don't think that boat owners are being picked on if you go out and see some of these other people's problems in taking on waste problems that you think have an easy ready solution.

It is tough; I realize it is tough, and it is going to cost money. But it seems to me we are faced with a critical threat to a national resource and we all have to set up a fairly stringent deadline and make efforts to do it or else the job isn't going to be done.

MR. SCHEMEL: Do you think a three and a half month deadline is fair when other people--

MR. STEIN: I am not commenting on the Chicago ordinance. I am just speaking generally.

MR. SCHEMEL: Well, we have to bring out the Chicago ordinance in order to show you that there is a definite need for uniformity all around the lake. We are an interstate sport. We don't just necessarily sit in the Chicago harbors.

We are saddled with an ordinance here in Chicago that it is almost impossible to comply with. What do we do? This is why we come to you and this is why I am here. We do have a problem. We would certainly appreciate your consideration and any help that we can get from this body and help us.

We want to stop pollution perhaps more than anyone else in this room because we are daily, during the summertime, in contact with it. We swim in it, we float in it, and we use it for washing water purposes, and so forth and so on, and we want a clean lake and we want to do what we can. But we do have a problem and we ask you for help, mainly in the form of uniform State regulations.

We would like to recommend once more

the model legislation by the National Association of State Boating Law Administrators. These are people who are very, very informed when it comes to boat safety, and so forth and so on. The National Sanitation Foundation is the leading organization for sanitary standards; it is a non-profit organization; you will get complete information on it later on. We would like your consideration.

In the meantime, we will do what we can to help, but we are saddled with a situation in Chicago which we can't hardly tolerate and we can't do anything about it. What do we do? Can you tell me? I don't know.

I have nothing to tell the small boater. He has no place to put any holding tank of any kind. If he leaves the Chicago area what does he do? He can't go to Michigan and have his tank pumped out; he can't go to Indiana to have the tank pumped out. To have a tank big enough on a small boat to last for two or three or four days with a family of two or three children is almost a physical impossibility.

This is about what it amounts to.

MR. STEIN: We understand your point of view. The Conferees will be giving consideration to boat pollution as well as any other kind of pollution. But I think Chicago has made an attempt to grapple with the law and we very rarely come in and tell a State or a City that is moving ahead with the pollution law that the law isn't to be obeyed, because you get--

MR. SCHEMEL: I recognize the fact that you are not going to tell Chicago to withdraw its ordinance. But we do want to highlight the point that there is a definite need for uniformity all around the lake in as far as boat pollution is concerned. Holding tanks are a problem; chlorinator macerators are a problem; and the entire picture of sanitary disposal for boats is a real package. And we would like your consideration.

I didn't recommend this chlorinator macerator. I merely said we wished you would consider it and perhaps look at it. This is all I have asked.

MR. STEIN: Are there any other comments or questions?

MR. HOLMER: Mr. Chairman.

MR. STEIN: Yes.

MR. HOLMER: I am curious as to the procedure by which this ordinance was adopted by the Chicago City Council. Was it extensive? Did it consider chlorinator macerators? Was there opportunity for full discussion of this issue before the City Council?

MR. SCHEMEL: The boating industry was told sometime ago that there was a possibility of an ordinance. The representatives requested to be heard at hearings. We were never notified about it. We found out through other channels that the ordinance was in process of being discussed and we had 15 minutes to get there and when we got there the ordinance was passed.

MR. STEIN: Oh, come now, I know these people in Chicago. I know the people who developed this ordinance. You may or may not agree with their decision, but I am sure they thoroughly considered the alternative of chlorinator macerators before they decided to go this course. I don't think we are going to be productive or get to this unless you feel you are dealing with professionals in Chicago who developed the ordinance and they believed they were making the best judgment under the circumstances.

I think we all have a right to point out what we think may be flaws or anything like that, but I know Chicago has been kicking this around for years. This wasn't something that was railroaded through. They have been discussing the various alternatives with special groups and making studies on this for a long time before they came up with that decision.

MR. KLASSEN: Mr. Chairman.

MR. STEIN: Yes.

MR. KLASSEN: Unless the speaker leave the impression--and I am not speaking for the City of Chicago because I am no official of the City of Chicago, but I know what went on--unless this speaker leave the impression that this was something that was pushed through without any consideration, this is leaving a false impression. This was thoroughly discussed with people that were interested in cleaning up the lake, not interested in making a lot of excuses why the boat owners couldn't comply. I was up in that party and I will take my responsibility for this.

Now, you said what can the boat owners do if they can't comply by the April deadline? I have got a real good suggestion what you can do. If it is an alternative,whether you go out and pollute the lake or stay home off the boat, stay off the boat.

MR. SCHEMEL: We don't want to pollute the lake.

MR. KLASSEN: Well, then, you come through with a solution or don't go out and pollute the lake. This is my own personal feeling.

We have heard for years from the boat people, and I mean for years, why they can't do this, why they can't do that. Now it is your turn to come up with something that you can do.

MR. SCHEMEL: Mr. Klassen, all I have asked is consideration for uniform standards around the lake and the possibility so we can comply with these standards once they are properly set up.

MR. KLASSEN: Somebody has got to take the lead. Chicago did it and the State of Illinois is going to back them.

MR. STEIN: Are there any further comments or questions?

MR. SCHEMEL: Thank you.

MR. STEIN: If not, thank you very much, sir.

Mr. Klassen.

MR. KLASSEN: Sandwiched in between here and the next speaker, who is going to talk on the same subject, we want to bring in a very brief statement by the Illinois Federation of Sportsmen's Clubs. These are the people that are out using the boats and using the water.

Harvey Tenner.

STATEMENT OF HARVEY TENNER
POLLUTION COORDINATOR
ILLINOIS FEDERATION OF SPORTSMEN'S CLUBS

MR. TENNER: The Illinois Federation of Sportsmen's Clubs is dedicated to the abatement of pollution in all forms. It, therefore, has considerable interest in this four-State Conference on pollution of Lake Michigan and wishes to express its thoughts for consideration by your group.

We believe this Conference is long overdue. Accordingly, positive action is expected from this meeting. We feel that enough evidence and information is available to all you responsible people to provide such action.

We are opposed to further studies, research meetings, etc., that would prolong and push the day of agreement further in the future. Innumerable times we read and hear of appropriations for further studies and no action. Each of the four States' representatives is fully aware of its State's contribution to the pollution of Lake Michigan, the type of pollution, the polluters, the locations and the remedies. There are enough means available to eliminate such pollution.

Ever since the initial Lake Michigan Conference in 1965, industry, governments, other contributors and interested parties have known that pollution would have to be stopped and by a prescribed date. That date for the most part is December 31st, 1968.

We believe that no quarter or extensions of time should be given polluters. They have had the time and opportunity to take corrective action. Many have intentionally dragged their feet to prolong the day that they must comply. They have no conscience in the harm they do to the community and take the attitude they have no obligation to the people and let the people pay the cost.

We believe that polluters should pay for the pollution they cause. Contrary to their statements that in complying they would be put at a competitive disadvantage, it can be demonstrated that they profit by such correction.

One of the more basic reasons for reluctance to abate pollution is that it is a non-productive expense that brings no profit and therefore should be avoided.

Illinois contributes its share to the lake's pollution. Its steel mills, the Lake Shore Sanitary Districts are examples. The filtration plant near Rainbow Beach each year shows in its tests an increase in bacteria count.

Indiana's steel mills and other processing industries likewise pollute and we are constantly told of raw sewage finding its way into the lake. One can't forget the water birds found there about two or three years ago having been killed by botulism E.

Milwaukee beaches are closed because they are unsafe. Along Wisconsin's borders there are many polluted streams that flow unchecked into Lake Michigan.

Michigan, among similar contributions, has DDT entering its side of the lake. The Coho salmon which it planted have been found to contain this and other deadly fertilizing chemicals. Paper-making liquors are found in the lake from uncontrolled dumping on the Michigan side.

Between now and 1970, six steel companies are planning on building new or additional facilities at the lower end of the lake.

The aforementioned are only a few examples to show that all the bordering States are making a substantial pollution contribution to the lake and all have equal responsibility in seeing that the problem is resolved expeditiously.

Penalties must be stiff enough to make

it unprofitable for contributors to continue. Meager penalties in many cases make it cheaper to pay than to install the facilities to stop it.

It is not our intent to say that industry is the sole contributor. Municipalities, government facilities, institutions and others by direct contribution or by inaction to stop pollution when they can are just as guilty.

While we haven't begun to overcome pollution, here is what's ahead of us:

By the year 2000 a 50 percent increase in population.

New homes will double in the same period.

Refuse and energy requirements doubling every decade.

While this is going on the total water and land available remains the same.

The task is monumental and we had better get with it now!

You people today have the greatest opportunity for service to the people. Make the fullest use of it.

Thank you.

MR. STEIN: Thank you, sir.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, thank you very much for your statement.

(The following statement was submitted for inclusion in the record as if read:)

ILLINOIS BOATING ASSOCIATION
CHAIRMAN FRANK HEYES, PRESIDENT
CHICAGO, ILLINOIS

January 26, 1968

State Sanitary Water Board
Springfield, Illinois 62706

Gentlemen:

The Illinois Boating Association, an organization which speaks for some 10,000 boaters in the State of Illinois is vitally concerned with the pollution of our Nation's waterways and especially the rapid deterioration of Lake Michigan.

ILLINOIS BOATING ASSOCIATION

No one is more concerned about the pollution of Lake Michigan than the boat owner who uses these waters for recreation. He is fully in accord with establishing pollution controls for wastes from pleasure craft providing such controls are uniform between States and between States and the Federal Government, and not a hodge podge of laws and ordinances from port to port and State to State such as found between Wisconsin and Minnesota along the upper Mississippi River.

Although recreational boats contribute an infinitesimal amount to the water pollution problem, every boat owner is ready and willing to do his share to keep our waters clean. However, he does ask that any anti-pollution regulations be practical, effective and uniform throughout the country; and that any target date for installing approved waste disposal devices be consistent with that granted to industry and municipalities.

Any such controls should not limit the type of devices to be installed as long as they meet water criteria standards. In many small boats and especially the smaller sailing craft retention tank systems are impractical and in many cases cannot be installed.

To effectively and firmly control pollution from recreational craft, therefore, the Illinois Boating Association offers the following recommendations:

WE RECOMMEND

1. That the Federal Government adopt the National Association of State Boating Law Administrators Model Act on Sewage Disposal and Littering from Vessels implemented by the National Sanitation Foundation's Uniform Performance Standards for Watercraft Sewage Treatment Devices as a guide to be followed by the States in the same manner as the Federal Boat Numbering Act.
2. That Federal water quality criteria standards be established and as far as practical and consistent be adopted by all States, and be in harmony with NASBLA's MODEL ACT

ILLINOIS BOATING ASSOCIATION

on Sewage Disposal and Littering from Vessels, and standards of National Sanitation Foundation.

3. That Federal legislation should be drafted to insure maximum uniformity and reciprocity between the States and between the States and Federal Government.

4. That the Federal Government establish uniform deadline for compliance consistent with that given industry and municipalities.

5. That the States attending this Conference, Illinois, Wisconsin, Indiana and Michigan adopt and follow the above guidelines for Lake Michigan.

On behalf of all IBA members, I wish to express our appreciation for being given this opportunity to express our views.

Very truly yours,

(Signed) Frank Heyes
President

FH/bhm

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ILLINOIS BOATING ASSOCIATION

NASBLA POLLUTION STUDY COMMITTEE

AMENDMENTS TO MODEL BOAT POLLUTION CONTROL ACT

ADOPTED NOVEMBER 17, 1967

"A Model Act to Prohibit Littering and the Disposal of Untreated Sewage from Boats," as it appears in Appendix C to the Report of the Pollution Study Committee of the National Association of State Boating Law Administrators, dated November 8, 1965, is hereby amended as follows:

(1) by striking the words "§241 and 243" immediately following the words "Title 42 United States Code" at the end of the fifth line of Section 1(a) and substituting the words "§252 and §262 to 272 and Title 8 United States Code, §1182(a) and (f), §1201(d), and §1224"

(2) by adding the following new section: "§17, RECIPROCITY Any toilet aboard a watercraft registered, documented or otherwise licensed in another State or country may be used on the waters of this State for a period not to exceed 30 consecutive

> days; provided such toilet is equipped with a pollution control device meeting the requirements of the watercraft's home jurisdiction."

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MR. STEIN: We will recess for lunch and reconvene today at 1:45. We will start very promptly, because there is a push for us to get out of the room early and we have to get through with the rest of Illinois and Indiana today. So I ask you to report back promptly.

(Whereupon, at 12:20 p.m., a recess was taken until 1:45 p.m. of the same day.)

AFTERNOON SESSION

(1:45 p.m.)

MR. STEIN: May we reconvene?

Mr. Morton.

ILLINOIS PRESENTATION (CONTINUED)

DR. BORUFF: Boruff speaking for Mr. Klassen.

Illinois would now like to call as a witness Mr.Ron Stone, Outboard Club of America.

Mr. Stone.

STATEMENT OF RON STONE

DIRECTOR, GOVERNMENT RELATIONS DEPARTMENT

OUTBOARD BOATING CLUB OF AMERICA

MR. STONE: Mr. Chairman, Mr. Morton, Conferees, ladies and gentlemen.

My name is Ron Stone. I am Director of the Government Relations Department of the Outboard Boating Club of America.

After this morning's debate I feel my name rather should be Daniel, because I feel like I am in the lions' den.

I speak for 46 organized boating clubs

RON STONE

in a four-State area near Lake Michigan who genuinely want to save their lake. I also speak for the Boat Owners Council of America serving 2,000 individual small boat owners in the same area who share that sentiment strongly.

Both organizations are consumer arms of the Boating Industry Association, a National non-profit trade association headquartered at 333 North Michigan Avenue, Chicago, Illinois.

The Boating Industry Association Nationally represents 350 manufacturers of recreational boating equipment. Nearly one-third of its members are located in the four-State area surrounding Lake Michigan. These local manufacturers make everything that goes with boating--boats, outboard motors, boat trailers, marine accessories and supplies; everything, with the vital exception of water.

Without attractive water, recreational boating would be out of the question and the boating industry would be out of business.

Boating is big business in the four-State area surrounding Lake Michigan. In 1967 we estimate recreational boaters in this area spent $550,000,000 at retail for new and used boats, motors, accessories, safety equipment, fuel, insurance, docking,maintenance, launching, storage, repairs and club memberships. Approximately 18.2 percent of the Nation's outboard motor market is found in Illinois, Indiana, Wisconsin and Michigan.

Any attempt on our part to estimate the number of people who do not go boating on Lake Michigan because of pollution would be guesswork, but we have reason to believe that many find the prospect repugnant because of the foul condition of some of the shoreline areas, particularly around harbors, industrial complexes, and tributary streams.

It is no wonder that we share your anxiety about the deteriorating condition of Lake Michigan. If manmade pollution is not arrested, our consumers are likely to be among the earliest casualties. Water pollution attacks boaters in many ways. It smears hard-to-remove scum and corrosive acids on their hulls.

It is a health hazard to them in direct contact water sports such as water skiing, scuba diving and swimming. It ruins their fishing. It robs them of fresh air and blue water--the basic attractions of recreational boating.

The facts already developed in this hearing and elsewhere on the threat of polluted water to human health, fish and wildlife, the diminution of recreational values, and eutrophication, make it crystal clear that this is everyone's problem.

Perhaps the fact that we are all in some measure responsible for the problem is one of the reasons why we are moving so slowly in bringing about a solution. If a single group could be pointed out as the offender, I am certain we would not tolerate it. But unfortunately the guilt is so widespread that we can and do point the finger at one another to take the pressure off doing our share to clean up the water. It would be ideal if industry, municipal sewage plants, agriculture and recreation could coordinate their pollution abatement efforts so that all at once Lake Michigan was reasonably clean again.

Realistically, some problems will take longer to solve than others. But there is no reason why we cannot establish a practical timetable for action by various groups so that Lake Michigan is gradually but positively redeemed.

In the past we maintained that pollution from recreational boats is a most insignificant factor when compared with the contaminating wastes which reach the water from other sources. We still feel that way. However, we are mindful that, if the growth of recreational boating continues at its present rate, eventually pollution from boats may become a real factor in the overall pollution picture. For that reason we are eager to do everything reasonably possible now to eliminate recreational boaters from the list of offenders.

Let's be objective. What is the nature of recreational boating's contribution to Lake Michigan pollution?

The main concern is that human feces discharged from boat toilets is adding bacteria and nutrients to the water.

No one knows exactly how many toilet-equipped pleasure craft there are on Lake Michigan.

We estimate that on all the waters of Illinois, Wisconsin, Indiana and Michigan combined there are fewer than 60,000 recreational boats with toilets. This estimate is based upon a 1965 study by the National Association of State Boating Law Administrators which concluded that only 5 to 10 percent of all recreational boats registered in this country today have toilets. Of the fewer than 60,000 boats in this four-State area which have toilets, it is reasonable to assume that only those kept within 50 to 100 miles from the lakeshore are used on Lake Michigan. Actually, then, the number is much smaller.

Littering, or throwing bottles, cans and garbage overboard is also of concern, but borrowing from experience in other parts of the country, we find the problem evaporates where government cracks down with stiff fines for littering, and boating organizations cooperate by promoting the use of litter bags to stow refuse for on-shore disposal.

The problem of sewage disposal from boats has not been as easy to attack. It is not a case of industry inaction or consumer indifference, because we have been promoting the use of sewage treatment and retention equipment for the past 10 years. As a result, you will find virtually all boat manufacturers today provide adequate space for pollution control devices on all boats that can reasonably be expected to use such equipment.

The stumbling block has been lack of direction from government, lack of uniform standards and guidelines for the manufacture of boat pollution control devices. Manufacturers have told us that they would gladly produce if government could agree on what they wanted in a boat pollution control device, but manufacturers are reluctant to get into the field as long as they face the prospect of fifty States and the Federal Government setting so many different standards that manufacturers cannot economically produce a boat pollution control device that will please everyone.

The boating industry long ago started taking steps to remedy this.

They cooperated with the National

Association of State Boating Law Administrators, the foremost group of government officials connected with recreational boating safety laws, in drawing up a practical model act to prohibit littering and the discharge of untreated sewage from boats. Its purpose is to foster uniformity and reciprocity between the States. It has produced results.

Thousands of copies of this model law have been distributed to people in and out of government all over the country during the last few years. Already eight States, including the Great Lakes State of New York, have adopted boat pollution control laws based upon the model law. So has the Tennessee Valley Authority.

Basically, the model act prohibits the discharge of inadequately-treated sewage from boats or the abandonment of containers of such sewage anywhere on or near the water. Use of boat toilets is conditioned upon having the toilet equipped with an approved sewage treatment device.

The Act recognizes three principal types of devices now on the market, chemical treatment devices that macerate and bacteriologically disinfect sewage before discharge, holding tanks and incinerators, provided appropriate instructions on their installation and use are followed. More exacting standards are provided in the model act for chemical treatment devices than holding tanks or incinerators, inasmuch as the chemical treatment device does permit discharge directly into the water.

The problem of litter is attacked through two methods: one by penalties and the other through authorization of vigorous educational public relations programs.

We believe the standards in the model act will stand up under close scrutiny. Several States, including New York, Minnesota and North Carolina, have conducted or sponsored laboratory or actual on-the-use tests of sewage treatment devices for watercraft. Several of the units tested have been found to be effective in treating human sewage in line with the standards of the model act and consistent with local water quality criteria.

A year and a half ago a National

Conference of government officials in public health and water pollution control decided that the National Sanitation Foundation of Ann Arbor, Michigan, was the most qualified from a public health standpoint to develop uniform performance standards and testing procedures for watercraft waste disposal devices. Industry has worked closely with the Foundation, which is a National not-for-profit testing laboratory connected with the School of Public Health at the University of Michigan; so have interested government representatives from the Michigan Water Resources Commission, the Wisconsin and Indiana State Boards of Health, and in an unofficial capacity a member of the Illinois State Sanitary Board. The result is that this year we can start testing and approving boat pollution control devices according to uniform biochemical, mechanical and marine safety standards. Several States have indicated they will weigh these standards heavily in approving boat pollution control devices for use on their waters.

We know many Lake Michigan boaters would gladly equip their boat with pollution control devices, if they could be assured that the equipment satisfied the requirements in more than one small area of cruising; and that they would not be put to additional expense by a change in requirements somewhere at a later date. Boaters are not procrastinating. Theirs is a very legitimate concern.

Boating around here is not confined inside the breakwaters of a harbor area. It is an interstate recreation. Hugging the shoreline of the southern end of the lake, small craft can easily navigate the boundaries of four States within 125 miles. It is quite common to find Chicago boaters off the shores of Michigan, Indiana and Wisconsin on holidays and weekend excursions.

All of the States surrounding Lake Michigan already have laws regulating sewage discharge from recreational boats. But the requirements vary. There is confusion of interpretation, and law enforcement is spotty and uncertain. Consequently, boaters are in a quandary. They do not know what to do. It is all very confusing.

RON STONE

As you know, the City of Chicago recently passed an ordinance requiring all boats with toilets operating in Chicago waters to have retention tanks installed by the 1968 boating season. In our opinion, the restrictions are tighter than necessary, but it is hard to fight City Hall, especially when they are under pressure themselves to clean up pollution from all sources. But it is this kind of piecemeal action without regard for the consequences outside city waters, that is complicating pollution control efforts in recreational boating. The Chicagoan who installs a retention tank for 1968 is going to be in a dilemma when he cruises outside of the Chicago harbor area, because frankly, gentlemen, we know of no shoreside facilities around Lake Michigan where he can go to have his holding tank pumped out. Neither Wisconsin, Illinois, Indiana nor Michigan law provide for onshore sewage disposal facilities for watercraft. The hapless boater is going to have no recourse but to empty his tank into the water.

It seems to us that this proliferation

of non-uniform regulations is aggravating the problem. What we need is a National uniform pollution control law for recreational watercraft with standards that boaters are capable of meeting. What you need is a law that can be respected and adequately enforced.

To accomplish this, we submit the following plan:

First: Because the States cannot fully agree on pollution controls for recreational vessels, we recommend that the Federal Government adopt a uniform vessel pollution control act with standards for vessel waste disposal devices. We do not mean the Federal Government should preempt the regulation of pollution from pleasure craft. Rather, we hope for a mechanism whereby the States, by agreeing to basic Federal standards, can obtain primary jurisdiction over vessel pollution control on all waters within their boundaries and give boaters the State-to-State uniformity they need. We believe that the control of water pollution and pleasure craft waste disposal should remain a State function.

Second: We recommend that the Federal

Government pattern its act after the Model Act to Prohibit Littering and the Disposal of Untreated Sewage from Boats drafted and endorsed by the National Association of State Boating Law Administrators. We also commend the uniform performance standards and testing procedures for watercraft waste treatment devices developed by the National Sanitation Foundation of Ann Arbor, Michigan. We feel there is no need for the Federal Government to start from scratch in evolving uniform standards and guidelines for watercraft waste treatment devices when eminent authorities in the field in the area of boating law administration and public health have already done so much. Copies of the recommended NASBLA model act and NSF's proposed standards are appended to my written statement for your careful study and I respectfully request that they be entered into the hearing record.

Finally, we ask for a delay in the enforcement of Federal, State or local laws and regulations in this area until after National standards for watercraft waste disposal devices have been established and meaningful tests of the various kinds of such devices have been completed. This in our opinion should take no longer than a year or two. Interim action by any level of government would, we feel, unreasonably foreclose the possibility of acceptance of some units that deserve to be proved effective in eliminating pollution from vessels.

The plan I have outlined seems to be the only rational way out of the maze of pollution control laws in which recreational boaters have been lost for the past several years.

But let me reiterate to make one point perfectly clear: We are not suggesting that the Federal Government take over the control of pollution attributable to recreational boating, only that the Federal Government establish basic standards for waste disposal from recreational craft that will show the States the way to uniformity and reciprocity.

It would be a mistake, in our opinion, to give any Federal agency absolute discretion to set standards or to approve devices to control waste disposal from watercraft. There has to be close cooperation between the Federal Government and State and local agencies responsible for water pollution control, public health, and boating law enforcement. Any rules or regulations established by Washington without carefully consulting the States could result in Federal-State conflicts of law that would make matters worse for boaters, not only from State to State but when proceeding from State to Federal waters within the boundaries of the same State. This is a real danger.

If the Federal Water Pollution Control Administration had consulted and collaborated with State boating law administrators when they were investigating pollution from recreational watercraft, we believe they would have reached more realistic conclusions in the report "Wastes from Watercraft," Document 82, dated June 30, 1967, which they sent to the 90th Congress.

For example, the FWPCA report states that 1.3 million pleasure boats, or one out of every six boats in the country, have toilet facilities. Actually the number of toilet-equipped pleasure craft is scarcely half of that. A recent National survey of marine toilet manufacturers found they have produced an aggregate of only 500,000 to 700,000 units since they have been in business. The number in use today is even less because over the years many toilet-equipped boats have been retired from service, destroyed or abandoned.

The FWPCA report leans toward holding tanks for boat toilets, because, they say, a dozen States now prohibit the discharge of sewage from recreational watercraft. That is specious reasoning, because a greater number of States, key boating States, expressly authorize sewage discharge from boats provided it is adequately treated according to local water quality criteria.

We feel the FWPCA report begs the question of providing adequate shoreside facilities for pumping out holding tanks. They say provision of such facilities can best be required and regulated under State law. But as I pointed out earlier in my statement, the States themselves are reticent to do anything about onshore pump-out facilities for vessel holding tanks. They seem to prefer to leave that to the pressures of business competition.

RON STONE

The FWPCA report overlooks all the documented facts and scientific information which the National Association of State Boating Law Administrators and the National Sanitation Foundation have produced. It makes little sense to us to undertake a whole new Federal program of establishing standards to evaluate the effectiveness of a variety of boat pollution control devices when the work has already been done by perhaps the most knowledgeable and experienced people in the field. We know these people would gladly be of assistance to the Federal Water Pollution Control Administration, if only they were asked.

In summation, the recreational boating sport and industry have a big stake in cleaning up Lake Michigan. You can count on us to help by stopping the discharge of raw sewage and littering, but we ask you to help us to do so. Give us a program of pollution abatement that is workable for the small boat owner and yachtsman alike. Give us laws that are uniform and reciprocal wherever recreational boats venture, not only on Lake Michigan but all other waters of our country. Give us reasonable time to comply with these laws, so that we don't have to plead for postponements of enforcement. Above all, let us hope that we are participating in a coordinated effort against lake pollution from all sources so that the water does not remain polluted after recreational boating has done its utmost to eliminate its very minor contribution to Lake Michigan pollution.

At this point, gentlemen, let me digress from the script and anticipate one of your questions: Do we go along with the Federal Water Pollution Control Administration recommendation for Statewide pollution control laws modeled after the Chicago ordinance? In all good conscience, we do not, at least not entirely. We have no quarrel with holding tanks, per se. However, we do feel that there are other devices on the market that are equally satisfactory as ways for arresting pollution. Many other local and State governments are equally satisfied that chemical treatment devices that macerate and disinfect toilet wastes will do the job. They destroy all bacteria in the effluent, which is the main concern from a public health standpoint. In fact, the effluent is purer bacteriologically after treatment than the water into which it is being discharged.

Thousands of boat owners throughout the country in good faith have bought and installed chemical treatment devices and are using them in compliance with the laws of their home State. If the Chicago ordinance were followed universally, they would have to rip out perfectly good equipment.

The only basis we have heard for Chicago's disaffection with chemical treatment devices is that they don't remove the nutrients from the effluent.

But how much nutrient are you really talking about when it comes to toilet waste from pleasure craft? At a recent hearing of the Chicago Park District testimony was received that the actual weight of nutrients in toilet wastes discharged from pleasure craft into Chicago harbor waters in a week amounts to only 3/4 of an ounce per boat, and that is assuming that all toilet equipped boats are used every week during the

3-1/2 month boating season in Chicago. Three-quarters of an ounce into four and one-half billion gallons of water in Chicago boat harbors seems pathetically little. It would take a mess of bowel movements to create a nutrient problem, and we defy anyone to say pleasure boaters have it in them.

(Laughter.)

It's shortsighted to say that we're going to cure the nutrient problem in boat toilet wastes by requiring holding tanks, because even if the wastes are kept on board and pumped out to shoreside facilities, there is no guarantee that after the wastes have gone into the sewer system and through the local sewage treatment plant that they will be purged of nutrients. Last Thursday we heard Dr.Bartsch say that even after ordinary secondary treatment substantial amounts of nutrient remain in municipal sewage that is discharged into Lake Michigan.

We submit that more study and work is needed on ultimate nutrient removal methods and criteria for nutrient levels in receiving waters.

You say it's the eleventh hour for

stopping accelerated eutrophication of Lake Michigan. We are the first to agree, but heaven help us. We say it's too early in the day to enforce boat pollution control laws like the Chicago ordinance.

The small boat owner can't comply with a holding tank law. The units now available on the market are too bulky to fit into his toilet compartment.

Even on larger boats there are problems. Expensive electrical, carpentry and plumbing work is involved in installing holding tanks and there is not enough time now to meet the May 15, 1968 deadline which the City has set.

There are not enough shoreside pump-out facilities around at this time to service the cruising pleasure craft on Lake Michigan.

The Chicago ordinance says that pollution control devices approved by the Port Director as satisfying the water quality standards of the Illinois State Sanitary Board for Lake Michigan may be used in lieu of a holding tank. Yet to our knowledge, the State has not established standards for effluent from vessels--for sewage treatment plants, yes, but not for vessels. So we ask, isn't it premature for Chicago to enforce an ordinance that still lacks standards?

The recreational boating community appreciates what Chicago is trying to accomplish to clean up Lake Michigan. We want to help. We ask only that the City appreciate some of the problems boaters are up against in trying to comply with a holding tank only law.

(The material submitted by Mr. Stone is as follows:)

A MODEL ACT TO PROHIBIT LITTERING AND THE DOSPOSAL OF UNTREATED SEWAGE FROM BOATS

TITLE

An Act to regulate the disposal of sewage from watercraft and to prohibit littering of waterways.

§ 1. DEFINITIONS

For purposes of this Act, unless the context clearly requires a different meaning:

(a) The term "watercraft" means any contrivance used or capable of being used for navigation upon water whether or not capable of self-propulsion, except passenger or cargo-carrying vessels subject to the Interstate Quarantine Regulations of the United States Public Health Service adopted pursuant to Title 42 United States Code § 241 and 243.

(b) The term "sewage" means all human body wastes.

(c) The term "litter" means any bottles, glass, crockery, cans, scrap metal, junk, paper, garbage, rubbish, or similar refuse discarded as no longer useful or usable.

(d) The term "marine toilet" means any toilet on or within any watercraft to discharge waste.

(e) The term "waters of this State" means all of the waterways on which watercraft shall be used or operated.

Note: In some States it may be desired to limit the application of this Act to certain waters only and thereby exempt large bodies of water or water areas that are remote from population centers and on which there is no congestion and no conceivable boat pollution problem. The waters subject to pollution control under this Act could be enumerated or the State agency which is designated to administer the Act could be authorized to make a finding that a particular waterway should or should not be affected.

(f) The term "person" means an individual, partnership, firm, corporation, association, or other entity.

(g) The term "Department" means the (name of the State agency which shall administer this Act.

The choice of agency lies within the discretion of each State. It is recommended, however, that consideration be given to the State agency dealing with boating matters in general.

§ 2. LITTERING OR POLLUTING WATER - RESTRICTIONS

(a) No person shall place, throw, deposit, or discharge, or cause to be placed, thrown, deposited, or discharged into the waters of this State, any litter, sewage, or other liquid or solid materials which render the water unsightly, noxious or otherwise unwholesome so as to be detrimental to the public health or welfare or to the enjoyment of the water for recreational purposes.

(b) It shall be unlawful to discharge, dump, deposit or throw garbage into the waters of this State from a watercraft engaged in commerce.

> This section is deemed sufficiently broad and flexible to prohibit any act committed onshore, in the water, or from aboard any description of watercraft, which litters or tends to pollute the water.

§ 3. MARINE TOILETS - RESTRICTIONS

(a) No marine toilet on any watercraft used or operated upon waters of this State shall be operated so as to discharge any untreated sewage into said waters directly or indirectly.

(b) No person owning or operating a watercraft with a marine toilet shall use, or permit the use of, such toilet on the waters of this State, unless the toilet is equipped with facilities that will adequately treat, hold, incinerate or otherwise handle sewage in a manner that is capable of preventing water pollution.

(c) No container of sewage shall be placed, left, discharged or caused to be placed, left or discharged in or near any waters of this State by any person at any time.

> This section prohibits the discharge of any untreated sewage from marine toilets.

§ 4. MARINE TOILETS - POLLUTION CONTROL DEVICES

(a) After the effective date of this Act every marine toilet on watercraft used or operated upon the waters of this State shall be equipped with a suitable pollution control device in operating condition.

(b) Pollution control devices that are acceptable for purposes of this Act are:

1. Facilities that macerate or grind sewage solids and which, by chlorination or other means, disinfect the remnants before discharge into the water.
2. Holding tanks which retain toilet wastes for disposal at dockside or onshore pumping facilities or in deep waters

away from shore.

3. Incinerating type devices which reduce toilet wastes to ash.

4. Any other device that is tested by a recognized testing laboratory and determined to be effective in arresting the possibility of pollution from sewage passing into or through marine toilets.

This section recognizes that there are a variety of devices on the market designed to eliminate the possibility of water pollution from sewage passing into or through toilets aboard watercraft. Many of these devices have been tested by various State public health and water pollution control agencies and independent laboratories and found to be efficient for their purpose. However, with further improvements and innovations likely in this product area in the future, it is unwize to "freeze" specifications for such devices in statutory language. All technological changes can be readily incorporated into rules and regulations.

The desirability of Nationwide uniformity in requirements for marine toilet pollution control devices cannot be emphasized too strongly. Boatmen will have to incur additional expense to install and maintain such devices. It would be a hardship and an inconvenience for boatmen traveling from State to State to be subjected to different jurisdictional standards of acceptability of these devices.

§ 5. MARINE TOILETS - CHEMICAL TREATMENT FACILITIES STANDARDS

(a) Every chlorinator or chemical treatment facility shall be securely affixed to the interior discharge opening of a marine toilet, and all sewage passing into or through such toilet shall pass solely through such treatment facility.

(b) Sewage passing through a marine

toilet equipped with a chlorinator or chemical treatment facility shall be deemed untreated unless the effluent meets the following minimum standards:

1. Sufficiently divided into fine particles so as to be free of unsightly solids.

2. Containing 1,000 or less coliform per 100 ml.

This standards meets the requirements of the U.S. Public Health Service and is acceptable by most State public health agencies for swimming and bathing purposes.

(c) The chlorinator or chemical treatment facility shall be of a type which functions automatically with the operation of the marine toilet, does not depend on septic action as part of its treatment, is easy to clean and maintain, and does not permit the escape of dangerous gases or obnoxious odors.

(d) The disinfecting agent used in the facility shall be of a kind that does not necessitate too frequent replenishment, is easily obtainable, and when discharged as a part of the effluent is not toxic to humans, fish or wildlife.

> The foregoing standards are generally acceptable under existing State marine chlorinator laws. In the interest of uniformity they are recommended to other States proposing the adoption of such laws.

§ 6. MARINE TOILETS - STANDARDS FOR MANUFACTURERS OF POLLUTION CONTROL DEVICES

Every manufacturer of a marine toilet pollution control device described in this Act shall certify to the Department in writing that his product meets the standards set forth in this Act or in any implementing regulations adopted by the Department. Every such certified statement shall be accompanied by a test report showing that the product meets the prescribed standards. It shall be unlawful to sell or to offer for sale in this State any marine toilet pollution control device that has not been so certified and approved by the Department.

§ 7. CERTIFICATE OF NUMBER

The Department may require persons making application for a certificate of number for a watercraft pursuant to (statutory citation of State Boat Numbering Act to be entered here) to disclose whether such watercraft has within or on it a marine toilet, and if so, to certify that such toilet is equipped with a suitable pollution control device as required by this Act. The Department is further empowered to direct that the issuance of a certificate of number or a renewal thereof be withheld if such device has not been installed as required by this Act.

§ 8. ONSHORE TRASH RECEPTACLES

The owner or whoever is lawfully vested with the possession, management and control of a marina or other waterside facility used by watercraft for launching, docking, mooring and related purposes shall be required to have trash receptacles or similar devices designed for the depositing of trash and refuse at locations where they can be conveniently used by watercraft occupants.

§ 9. EDUCATION

The Department is hereby authorized to undertake and to enlist the support and cooperation of all agencies, political subdivisions, and organizations in the conduct of a public educational program designed to inform the public of the undesirability of depositing trash, litter, and other materials in the waters of this State and of the penalties provided by this Act for such action, and use funds provided by the legislature for this purpose. The Department is further authorized to utilize all means of communication in the conduct of this program.

§ 10. ENFORCEMENT

All watercraft located upon waters of this State shall be subject to inspection by the Department or any lawfully designated agent or inspector thereof for the purpose of determining whether such watercraft is equipped in compliance herewith. The Department is further authorized to inspect marinas or other waterside public facilities used by watercraft for launching, docking or mooring purposes to determine whether they are equipped with trash receptacles and/or sewage disposal equipment.

§ 11. LOCAL REGULATIONS PROHIBITED

Through the passage of this Act, the State fully reserves to itself the exclusive right to establish requirements with reference to the disposal of sewage from watercraft. In order to ensure Statewide uniformity, the regulation by any political subdivision of the State of sewage disposal from watercraft is prohibited.

§ 12. RULES AND REGULATIONS

The Director of the Department is hereby authorized and empowered to make, adopt, promulgate, amend and repeal all rules and regulations necessary, or convenient for the carrying out of duties and obligations and powers conferred on the Department by this Act.

§ 13. FILING OF REGULATIONS

A copy of the regulations adopted pursuant to this Act and any of the amendments thereto, shall be filed in the office of the Department and in the office of the (official State recordkeeping agency). Rules and regulations shall be published by the Department in a convenient form.

§ 14. PENALTIES

(a) Every manufacturer of a marine toilet pollution control device who violates Section 6 of this Act or any regulations adopted by the Department pursuant thereto shall be deemed guilty of a misdemeanor and upon conviction shall be punished with a fine of not more than $____.

(b) Any person who violates any other provisions of this Act or regulations of the Department adopted pursuant thereto shall be deemed guilty of a misdemeanor and upon conviction shall be punished with a fine of not more than $___, or by imprisonment of not more than ____ days, or by both such fine and imprisonment at the discretion of the court.

§ 15. SAVINGS CLAUSE

If any court shall find any section or sections of this Act to be unconstitutional or otherwise invalid, such findings shall not affect the validity of any sections of this Act which can be given effect.

§ 16. EFFECTIVE DATE

The provisions of this Act with reference to requiring watercraft with toilet facilities to be equipped with pollution control devices shall take effect three years from the date of the adoption of this Act. The provisions of this Act prohibiting littering the waterways shall take effect immediately.

RON STONE

It is suggested that the effective date of this Act be delayed so that all persons affected by its provisions will have a reasonable amount of time to become acquainted with it and secure the required treatment devices.

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NASBLA POLLUTION STUDY COMMITTEE
AMENDMENTS TO MODEL BOAT POLLUTION CONTROL ACT
ADOPTED NOVEMBER 17, 1967

"A Model Act to Prohibit Littering and the Disposal of Untreated Sewage from Boats," as it appears in Appendix C to the Report of the Pollution Study Committee of the National Association of State Boating Law Administrators, dated November 8, 1965, is hereby amended as follows:

(1) by striking the words "§241 and 243" immediately following the words "Title 42 United States Code" at the end of the fifth line of Section 1(a) and substituting the words "§252 and §§262 to 272

and Title 8 United States Code §1182(a) and (f), §1201(d), and §1224"

(2) by adding the following new section: "§17, RECIPROCITY Any toilet aboard a watercraft registered, documented or otherwise licensed in another State or country may be used on the waters of this State for a period not to exceed 30 consecutive days; provided such toilet is equipped with a pollution control device meeting the requirements of the watercraft's home jurisdiction."

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THE NATIONAL SANITATION FOUNDATION
PROPOSED STANDARD FOR
WATERCRAFT SEWAGE DISPOSAL DEVICES

(December 1967)

SECTION 1 - GENERAL

1.00 COVERAGE: This Standard covers devices intended for the control of sewage aboard watercraft. Said devices may be designed for treatment and discharge, treatment and storage, holding or destruction of sewage, or any combination thereof, intended for use aboard watercraft. It shall include those appurtenances and/or attachments thereto that are necessary for the proper function of said devices or which modify their operation or function.

1.01 MINIMUM REQUIREMENTS: These Standards are established for the evaluation of equipment covered herein and are considered to be basic and minimum requirements.

1.02 ALTERNATE MATERIALS: Variations are permissible when they tend to make the equipment more resistant to corrosion, wear and physical damage, or if they improve the general operation and performance of the device. Variations shall be approved prior to their use. Where specific materials are mentioned, it is understood that the use of other materials proved to be equally satisfactory in every respect will be acceptable.

1.03 REVIEWS AND REVISIONS: Following adoption of the Standard and prior to its printed publication, a general review shall be carried out by the National Sanitation Foundation Committee on Watercraft Sewage Disposal Devices to determine the adequacy and appropriateness of the requirements and to ascertain if additional requirements are indicated. Subsequent to the printed publication of this Standard, complete review of the Standard shall be conducted at intervals of not more than three years to determine what changes, deletions, or additions, if any, are necessary to maintain current and effective requirements consistent with new technology and progress. These reviews shall be conducted by appropriate representatives from the public health, industry, safety agencies and user groups. Final adoption of revisions shall be in accordance with the procedures established by the NSF Committee on Watercraft Sewage Disposal Devices.

SECTIONS 2 - DEFINITIONS

2.00 BY-PASS: The term "by-pass" shall mean any provisions, mechanical or functional, by which an operator can selectively discharge untreated sewage into the waterway.

2.01 FAILSAFE: "The word "failsafe"

shall mean failure in a manner that will automatically preclude discharge of untreated sewage to the degree established in this Standard, when installed and operated in accordance with the manufacturer's instructions.

2.02 FRESH WATER: Those waters having a specific conductivity less than a solution containing 6000 ppm of Sodium Chloride. (9,400 micro ohms resistance)

2.03 SALT WATER: Those waters having a specific conductivity in excess of a solution containing 6000 ppm of Sodium Chloride. (9,400 micro ohms resistance)

2.04 WATERCRAFT: A floating vessel, intended to accommodate not more than 40 persons.

2.05 SEWAGE: The term "sewage" means all human body wastes.

2.06 SEALING: The word "sealing" shall mean attachment of a fastener which cannot be removed without evidence thereof.

2.07 TECHNICAL WORDS AND TERMS: Technical words and terms used in the context of this Standard shall be understood to be as defined and used in Nationally recognized test methods and procedures as herein referenced.

SECTION 3 - MATERIAL

3.00 GENERAL: Materials used in the construction of watercraft sewage disposal devices shall be capable of withstanding exposure to the intended use environment, with special attention to the operation of watercraft, the corrosive actions of chemical intended for use in connection therewith and the corrosive actions of fresh and/or salt water.

3.01 DURABILITY: All materials shall be durable and capable of withstanding the normal stresses incident to shipping, installation and operation. They must be structurally sound, under operation conditions.

3.02 DISSIMILAR MATERIALS: Dissimilar materials may be used but shall have galvanic compatibility.

3.03 WELDING: When weldments are used, the weld area and deposited weld material shall meet the applicable corrosion resistant requirements. (See Items 3.00 and 3.02)

SECTION 4 - DESIGN AND CONSTRUCTION

4.00 GENERAL: A watercraft sewage

treatment or storage device shall be designed and constructed such that the intended purpose of the device, when installed and operated in accordance with the manufacturer's instructions, shall not be adversely affected by operation of the watercraft nor by the normal environment to which it is subjected. Normal conditions shall include vibration, pitch, roll, heel, shock, temperature and chemicals used. The device shall be free of non-functional rough or sharp edges, or other hazards which could cause injury to persons operating or servicing the unit.

4.01 FAILSAFE: All devices shall be "failsafe".

4.011 There shall be a positive and recognizable indication to the user that the system has failed (non-operative or malfunctioning.)

4.02 BY-PASS: Devices shall be classified as to whether they are "with" or "without" by-pass provision. All literature and the data plate (see Item 4.09) shall state the appropriate classification. If a "by-pass" is provided in or on a sewage disposal device it shall provide positive closure and provisions shall be made for sealing same.

4.03 HOLDING (STORAGE) TANK: When a device or appurtenance is designed, or intended, to prevent the discharge to the waterway of treated or untreated sewage, it shall be capable of positive closure and means provided for sealing same. Storage tanks shall have the tank outlet located in the bottom of the tank or otherwise designed so that complete draining of the tank may be assured.

4.04 FITTINGS - HOLDING TANKS: Fittings intended for use in emptying holding and retention tank devices shall be designed to receive an insert tube capable of friction fit in the Inside Diameter of a 1-1/2" N.P.S. Schedule 40 pipe. Said fitting shall, in addition, be designed, constructed and/or equipped to assure a liquid tight closure during normal operation of the watercraft; afford no obstruction to the flow of sewage; shall be cleanable; and shall when necessary, be designed to prevent the discharge of static electricity.

4.041 Fittings intended for use in emptying holding and retention tanks shall be permanently and legibly marked with the word "WASTE". If the cover is detachable, then both the cover and fitting shall be so marked.

4.05 OPERATION UNDER LOAD CONDITIONS: Treatment and discharge devices shall, when installed and operated in accordance with manufacturer's instructions, be capable of producing an effluent meeting the microbiological and chemical/ physical requirements of this Standard throughout the testing period of two hours operations at normal load conditions after initial discharge, followed by 20 minutes of operation at peak conditions, and then an additional two hours at normal load conditions.

4.051* NORMAL LOAD CONDITIONS*: The device shall be placed in service and used (flushed) at a frequency of 1/2 hour. When discharge of effluent is evident, the normal loading shall continue for a period of two hours, at which time the Peak Load conditions (Item 4.052), shall be applied.

4.052* PEAK LOAD CONDITIONS*:

Single Head Units: The minimum time between uses (flushes) under peak load conditions shall be considered to be five (5) minutes over a 20-minute period.

Multiple Head Units: Peak load conditions for multiple head units shall be considered simultaneous uses (flushes) of all units possible at five (5) minute intervals over a 20-minute period.

4.06 SERVICEABILITY: Units shall be so designed and constructed that when installed in accordance with a manufacturers recommendations, they shall be capable of being easily maintained, drained and cleaned.

4.07 ENERGY AND CHEMICAL REQUIREMENTS: The manufacturer's engineering data and literature shall specify the power requirements to properly operate the device and/or its necessary auxiliary systems.

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* Artificial media may be established for normal and peak load evaluations.

4.071 Both the manufacturers literature and data plate shall state the type of chemicals to be used, if any. If of a proprietary nature, the trade designation shall be given; or, if of a non-proprietary nature, the chemical name and its strength shall be stated.

4.072 When there is an effluent discharge there shall be a field test method available for determining the strength of the chemical specified.

4.073 Chemicals used in a recirculating non-discharge type device shall at least be capable of maintaining the recirculated media in a bacteriostatic condition throughout the maximum recommended use cycle.

4.08 PARTS LIST; There shall be a comprehensive parts list provided by the manufacturer with each unit. The individual parts shall be identified by means of illustration, photographs or the like, and be designated by number, letter, symbol, etc.

4.09 INSTRUCTIONS: The manufacturer shall provide clear, concise, instructions with each unit which, when followed, will assure proper installation, safe and satisfactory operation and adequate procedures for long-term storage and/or securing the unit. Said instructions shall also provide recommendations for the safe storage and handling of chemicals and/or energy.

4.10 DATA PLATE: A permanent type data plate shall be provided, so inscribed as to be easily read and understood, and securely attached to the device at a location which is normally visible following recommended installation, or visible under normal servicing. Said data plate shall include the following:

4.101 Name of manufacturer.

4.102 Model and/or serial number designation.

4.103 Use capacity of unit.

a Capacity of treatment and disposal devices shall be noted in one or more of the following means:

(1) the chemical dosage required per use

(2) number of uses per the chemical storage provided

(3) comparable type of rating

b. Storage tank capacity shall be stated in terms of gallons and/or number of uses of a given volume.

4.104 The type of chemical to be used:

a. If Proprietary - the trade name shall be stated.

b. If non-proprietary - the chemical and strength thereof shall be stated.

4.105 Energy requirements. (Electric, gas, etc.)

4.106 Classification as to by-pass ("with" or "without").

SECTION 5 - EFFLUENT REQUIREMENT

5.00 GENERAL: The effluent discharged into the waterway shall not produce a color, odor, oily film, or foam in excess of the limits specified in Item 5.003 when the effluent is thoroughly mixed with distilled water at a 1 to 1000 dilution.

5.001 The effluent discharged into the waterway shall contain no corrosive or toxic materials which are persistent and/or which produce a nuisance.

5.002 Evaluation procedure shall, insofar as possible, be those established in the latest edition of "Standard Methods for the Examination of Water and Waste Water" published by the American Public Health Association.

5.003 Acceptable Limits:

Color - 15 units

Threshold Odor - 3

Oily Film - no visible evidence other than air bubbles.

Foam - None

5.01 ACCEPTABLE LIMITS - BACTERIOLOGICAL: Devices designed to treat and discharge sewage from watercraft shall produce an effluent containing not more than 1,000 fecal coliform per 100 ml. Such devices shall be classified based on their ability to reduce the fecal coliform count of sewage under the load operating conditions set forth in this Standard. The following fecal coliform counts shall serve to establish these classifications:

CLASS	FECAL COLIFORM IN EFFLUENT
I	0/100 ml
II	240/100ml or less
III	1,000/100ml or less

5.011 The procedures used shall be those established in the latest edition of "Standard Methods for the Examination of Water and Waste Water" published by the American Public Health Association.

5.02 SUSPENDED SOLIDS: An effluent discharged to the waterway shall contain no visible definable suspended solids.

5.03 NUTRIENTS: The treatment process, or chemicals used, shall not contribute to the nutrient content of the effluent discharged to the waterway.

5.04 TOXICITY: The effluent discharged into the waterway shall be free of substances in concentrations or combinations which are toxic or harmful to human, plant, animal or aquatic life. Any disinfecting agent shall be non-persistent.

5.05 ATMOSPHERIC DISCHARGE: Where gaseous effluents result from the treatment or holding systems, the effluent shall:

a. Be free of substances in concentrations, or combinations, which are toxic or harmful to human, plant, animal or aquatic life.

b. Contain no viable microorganisms.

c. If combustible, the manufacturer's installation instructions shall describe a means for safe discharge of said effluent.

d. If emanating from an incinerator, contain no carbon monoxide, smoke, fly ash or objectionable odors or fumes when tested and as defined in U.S.A. Standard No. Z 21.6-1966

(Paragraph 2.4 and 2.11).

e. If corrosive, the manufacturer's installation instructions shall describe a means for safe discharge of said effluent.

f. Provision shall be made in the design and construction of devices to prevent the emission of odor or noxious fumes into the interior of the watercraft when installed and operated in accordance with the manufacturer's recommendations.

SECTION 6 - SAFETY

6.00 GENERAL: Watercraft sewage disposal devices shall be designed and constructed so as to present no condition which may adversely affect the craft in which they are installed or the occupants thereof.

6.01 VENTING: Provision shall be made for venting when necessary to the exterior of the vessel of gases and vapors and liquid emanating from the device. Overboard vents shall be located to minimize the inboard return of odors through parts or other openings, and shall be provided with means to prevent the intake of water (spray) into the device. Vents shall be connected to the device in such a manner, and shall be of such a diameter as will prevent pressure buildup in the device by being free of clogging by the accumulation of solids or liquids therein.

6.02 ELECTRICAL COMPONENTS AND SYSTEM: The National Fire Protection Association Standards for Motor Craft (NAFB No. 302) as well as the applicable Standards of the American Boat & Yacht Council shall serve as a guide for the evaluation of electrical components and systems.

6.03 WATERTIGHT INTEGRITY: The manufacturer's installation instructions shall clearly indicate that each thru-hull connection below the waterline which serves as water intake or overboard discharge, be equipped with a means to prevent the entrance of water into the device or craft. The instructions shall also clearly state that where by-pass or other plumbing are connected to the device, this plumbing shall enter the overboard discharge line inboard of the closure means.

Further, the manufacturer's installation instructions and details shall specify that plumbing connections made between the device and the hull shall be of such strength and durability as to resist all operating pressures and stresses imposed thereon.

6.04 COMBUSTION-TYPE DEVICES: When the device is of a combustion type, the manufacturer's installation instructions shall provide sufficient guidance to assure that flues and fuse connections are constructed and installed as set forth in current editions of the National Fire Protection Association Publications No. 54 and 302.

MR. STONE: Thank you.

MR. STEIN: Thank you. Are there any comments or questions?

Yes, Mr. Morton.

MR. MORTON: This is Morton speaking for Illinois.

There were references in Mr.Stone's talk to the National Sanitation Foundation and the fact that the Illinois Sanitary Water Board is represented on the committee work at the National Sanitation Foundation.

We would just like to make it clear that the purpose of the National Sanitation Foundation is to come up with a testing procedure to determine whether boat devices as well as other devices which the Foundation studies are suitable. It is not our understanding that the National Sanitation Foundation is designing standards for the construction and operation of boat facilities.

I would also like to point out that the NSF document which has been passed out by Mr. Stone is still an internal document of the National Sanitation Foundation. It has not been officially approved, and it is still subject to change. But this is a document dealing with procedures for testing the operation of these devices and not for the design of them.

MR. STONE: If I may elaborate, the standards of the National Sanitation Foundation are now complete insofar as the work of the Joint Committee on Watercraft Waste Disposal, which is the task force of the Foundation, is concerned. The only step remaining now is to submit them under procedures of the National Sanitation

Foundation to their own Board of Directors for approval.

So to all intents and purposes, the technical work on the standards is finished at this time and we expect approval within the month.

MR. STEIN: Are there any other questions?

MR. MITCHELL: I really can't find some agreement here with the statements that Mr. Stone has made. For example, he says on one page that they recommend the Federal Government adopt a uniform vessel pollution control act with standards for vessel waste disposal devices, then on another page he says we are not suggesting that the Federal Government take over control of pollution attributable to recreational boating.

I don't see how those two sentences are compatible at all. Either they do it or they don't do it.

The other point being that it seems to me that he is saying here that he does not want the State Government to give up their rights to regulate pollution control, but on the other hand it seems he is trying to say he wants the Federal Government to tell us how to do it.

It seemed to me the State Government has either got to stand up and be counted here or get out of the business and turn it over to you, and I am not in favor of that right now.

Another point here is that he is suggesting that we delay enforcement if we do pass a law, and I have been involved in our Department of Natural Resources in Indiana and we have got a lot of laws and once they are passed by our legislature they are going to be enforced, because I don't think administratively we ought to decide when to start enforcing laws that some legislative body has decided ought to be passed.

MR. STEIN: Do you want to comment on this?

MR. STONE: Yes, I do.

First of all, I am not suggesting that the Federal Government do something at loggerheads with the States. There is precedent for what I have suggested in the establishment of water quality criteria on interstate waters whereby the States take over the establishment of water quality criteria with the guidance of the Federal Government. This establishes basic standards.

There is also precedent in the area of recreational boating for Federal guidance of the States in the boat numbering program whereby under the Federal Boating Act of 1958 the Federal Government established uniform standards for boat numbering and the States had the option of taking over boat numbering on all waters in their jurisdiction provided that they at least met minimum Federal standards.

MR. STEIN: Well, I think his point is well taken. And just not to get into--because I think Mr. Mitchell has raised the key point, which you haven't addressed yourself to.

You say, "Finally"--and this Mr. Mitchell alluded to--"we ask for a delay in the enforcement of Federal, State or local laws and regulations in this area until after national standards for watercraft waste disposal devices have been established and meaningful tests of the various kinds of such devices have been completed."

I don't know how long, if we get that, it would take.

But I would like to point this out to you, Mr. Stone. Once the State or the Federal Government passes a law, no one, if we are dealing with the government--the laws are not men--can decide when you begin enforcing them.

(Applause.)

MR. STEIN: Secondly, I would like to point out if we contrast this with the notion of the so-called large polluters are major industries and cities, to my knowledge, and I have been doing this for 25 years and have been dealing with them all, none of them, to my knowledge, has ever said that we had to have a delay in enforcement until we got complete national standards. If we ever waited for that, we wouldn't have a Lake Michigan or any clean waters in the country. What kind of a bizarre position is this?

MR. STONE: It is not bizarre. It is a plea for reasonableness, and that certainly is not bizarre.

The boaters are in a position today where they are put to the expense of installing and using equipment with no assurance that it is going to be acceptable from State to State.

MR. STEIN: You are getting off the question, sir. Do we have national standards for water pollution control in the country today? Where would we be if the big oil companies, the big steel companies and the States we are dealing with here told us they weren't going to enforce a law until we had these national standards? Where would the country be today?

MR. STONE: Because a given State can enact a law requiring a boater to do something, and it is not an irreversible decision. They can come back later and say, ah, we think these subsequent standards, national standards, are better, cease and desist from what you were doing before, take out the equipment, start on a new tack. This has happened, it has happened in boating.

MR. STEIN: Are there any further comments or questions?

MR. OEMING: I have a question.

MR. STEIN: Yes.

MR. OEMING: This is Oeming from Michigan.

Mr. Stone, would you please reconcile for me the statement in your first recommendation with respect to uniform vessel pollution control acts by the Federal Government with your recommendation on the model act which excludes certain passenger and cargo-carrying vessels subject to interstate quarantine regulations.

How is this uniform? Where is the uniformity here?

MR. STONE: We are concerned with recreational craft. These are vessels that carry a complement of 40 passengers or more, do not fall in the category of small pleasure craft, which is our concern, and we were given to understand--well, it is an established fact that at the time the model act was being drafted the U. S. Public Health Service was in stages of adopting regulations for the larger passenger-carrying vessels. Therefore, we felt this was beyond our purview, since we were mainly concerned with recreational craft. This was the act of a government organization that is concerned with administration and enforcement of recreational boating laws, so we didn't want to trespass in other areas.

MR. OEMING: Well, the point of the matter is that your statement began to use terms here that could apply to recreational as well as the other kinds of watercraft.

MR. STONE: No, we only want to do what concerns us in recreational boating.

MR. OEMING: You used the term "vessel" in here, Mr. Stone.

MR. STONE: Well, it is a question of semantics, I grant you, sir.

MR. STEIN: Are there any further questions or comments?

Let me ask you, turning to page 8,(1747) when you talk about conflicts of law which would result by boaters proceeding from State to Federal waters within the boundaries of the same State.

MR. STONE: Yes.

MR. STEIN: When does anyone go from a State to a Federal water within the boundaries of the State? When is that point reached?

MR. STONE: Well, not all waters within the boundaries of a State are purely State waters. Not all waters are Federal waters where you have primary jurisdiction.

MR. STEIN: Well, when do you go from a State to a Federal water?

MR. STONE: Because boaters are very mobile, they are not confined to one body of water.

MR. STEIN: I know that, but it is my understanding of the case--

MR. STONE: I will give you an example.

MR. STEIN: --the Federal Government may have jurisdiction over navigable waters. It is my understanding of the case we have concurrent jurisdiction with the States of most waters. If we are hard put for a definition or a boundary between a State or a Federal water, I think we are turning back the clock in this government.

MR. STONE: I will give you an example.

MR. STEIN: We don't have that kind of a concept.

MR. STONE: May I give an example?

MR. STEIN: Yes.

MR. STONE: All right. Let's assume we have a State such as Minnesota, where since 1961 they have had a law regulating sewage discard from vessels which takes cognizance of your chemical treatment device as well as holding tanks or incinerators. You have an option; any one of the three devices will satisfy the Minnesota Water Pollution Control Board.

Take a man who has this chemical treatment device installed according to the Minnesota law who goes onto a Federal body of water, such as the Mississippi River, and assume--this is just hypothetical--assume at some later date the Federal Government had a holding-tank-only law such as that of Chicago.

MR. STEIN: You made the big jump in the question. Why do you assume that the Mississippi River is a Federal body of water and not at the same time a State body?

MR. STONE: Because if there were--of course the State has concurrent jurisdiction, but where there is a conflict of law between State and Federal Government on a water that is primarily Federal jurisdiction, then the Federal law takes precedence over the State law and the State law must follow.

MR. STEIN: As far as I know, if we are talking about the supremacy of the Federal law, we are not talking about a conflict, and this is why I don't understand the problem.

MR. STONE: There is a very clear conflict as far as the boater is concerned because his equipment is not usable uniformly throughout the boundaries of that State.

MR. STEIN: Equipment may not, but this is precisely the point. I don't think we are talking about Federal or State waters, but I think we have concurrent jurisdiction over both waters and this is what runs through the whole operation here--

MR. STONE: The Federal Government would not have concurrent jurisdiction with the State on purely State waters.

MR. STEIN: The whole burden of your operation is that you haven't moved because the government--the stumbling block has been a lack of direction from government. I assume you mean State or Federal Government.

MR. STONE: Both, yes.

MR. STEIN: But the manufacturers can produce devices if we only tell them what to do.

MR. STONE: Yes.

MR. STEIN: I don't know that the people we have been working with have seen the manufacturers come through with these devices. But this strikes me as passing strange in our kind of free economy where you have a development of the automobile industry, the steel industry, the petroleum industry where these industries develop devices to go across State lines into interstate commerce who say they can't move and it is the fault of government without uniform devices. The question, it seems to me, is that when you have to come up to do it, then you ask for government direction.

But your next point is, you say that the National Conference of government officials decided that the National Sanitation Foundation was the most qualified. Then you are asking government direction and indicate that we have a Federal report which overlooks all documented facts and scientific information. The Federal report, you say it makes little sense; the work has been already done by the most knowledgeable and experienced people in the field.

Now, what--

MR. STONE: I am talking about recreational boating.

MR. STEIN: Now, what is the point in asking for Federal uniformity and Federal direction if when this Federal report comes out this is what you say about the Federal report? When Chicago passes an ordinance you don't want to follow it.

MR. STONE: That report, sir, was published without the cooperation of the boating industry and the boating public. We were not consulted.

MR. STEIN: But on the one hand don't you see your point? You are asking, one, for Federal standards and Federal cooperation. When Chicago does something or the Federal Government does something you don't want to do, then you say it is no good. Now, it seems to me--

MR. STONE: I am saying that whatever we do in the area of regulation, it has to be a cooperative approach.

MR. STEIN: We recognize it has to be a cooperative approach.

MR. STONE: Yes, sir.

MR. STEIN: But let me make this clear, and I think this is the main point.

I think the Congress has been very, very careful in exercising the full constitutional authority it can to regulate pollution control over navigable waters. We all agree that the primary rights and responsibility should be left with the States.

Now, I would suggest that this business of talking about Federal controls or Federal standards, unless we know really carefully what we are doing, may open the Pandora's Box and may have repercussions that go beyond what you ask for. I say this to the State people, we believe that the States and places like Chicago should be given the full opportunity to enforce regulations from pleasure boats.

I would hope that boat owners or boat associations should not excuse their lack of compliance with the State or local ordinance or law with the notion that the Federal Government hasn't moved, because I think you are going around in a circle while in the next breath every document that the Federal Government puts out is unrealistic and is done without consultation.

I don't think you can be on every side of the situation.

MR. STONE: I would hope, in the light of my remarks, that we could use this as a starting ground and get down to work.

MR. STEIN: Are there any other questions?

Mr. Oeming.

MR. OEMING: Mr. Stone, do I take it that you still, despite what you have said here, recommend the Association of Boating Law Administrators Model Act in totality? You are not departing from this?

MR. STONE: These are the only uniform

guidelines we have now, so it is better than nothing.

MR. OEMING: Well, you didn't answer my question.

MR. STONE: Yes. Yes.

MR. OEMING: How can you come up with this idea of State and Federal law or waters when you say in your Boating Law Administrators proposal, "the term 'waters of this State' means all of the waterways on which watercraft shall be used or operated"?

MR. STONE: Sir, this contemplates all waters. As Mr. Stein pointed out, the State would have concurrent jurisdiction on Federal waters, so I don't see any inconsistency there.

MR. OEMING: Well, I can't make your--

MR. STONE: The point where I saw the inconsistency was that conversely the Federal Government would not have concurrent jurisdiction on all State waters.

MR. OEMING: I just don't make--I can't make your statements consistent here with what you have stated and what the Boating Law Administrators propose. This is my point.

MR. STONE: I don't see why that act cannot be a model for Federal action, and why we are praying for Federal action is because that way we are going to get the broadest uniformity possible. I hope I made the point that we are not asking for a complete takeover by the Federal Government. We just want the Federal Government to cooperate to show the States the way.

I don't see why this should be beyond comprehension, because it has already been done in the Water Quality Control Act and the Federal Boating Act of 1958.

MR. STEIN: I don't know that we should pursue it, but I think sitting up at this table I see people here who on the average have at least 25 years experience in dealing with Federal-State cooperative programs. Most of us have been wrestling with this Federal-State relationship for all our professional lives. We have argued many, many times over proposed law and proposed statutes.

This kind of loose language or loose concept does not solve these problems for us that we have been working with for years. Either the State has jurisdiction, we have jurisdiction, or we have concurrent jurisdiction.

The point is we have concurrent jurisdiction over the waters. We don't recognize anyone going from a State to a Federal water. As far as we are concerned, they are State waters. You may go into those waters and violate a Federal law, but as far as I am concerned they are State waters.

The next question we had was when we had to grapple with this business on these standards. And you are talking about uniform standards. The States put them out, but they become Federal standards and they are enforceable by the Federal Government.

And I don't know where you are going to slice this kind of operation, because the point is if we just put out, as we have, a model law or a model regulation as a suggestion, then it is up to the States to adopt it. By your own testimony you have said that you put one out for them already. Why do you want us to duplicate that work? I can't see what you are getting at.

MR. STONE: What we recommend, of course, is not necessarily going to be taken up by State Government. But if the Federal Government puts something out, this is an inducement for State action. What emanates from industry and the boating public will not necessarily be followed by State Government, but what happens at the level of Federal Government carries much greater weight.

MR. STEIN: I wish I could be as sure of that.

But you see, any time we come up with a recommendation, as you pointed out, that isn't consummate with the conclusions you have already made, you are ready to throw it out.

The point is, I think we people who have been doing that are, I would say, rather confused by the concepts.

I think you are striving for the same end we are, but I would suggest, and I really mean this, that we need a lot more talk, and you talk to the State officials and the Federal people, to get some of the notions you have put up, the concepts you have put up really sharpened with discussion, because--and I am not deprecating any of your notions or ideas, but what I am saying to you is that you probably have 500 years worth of experience dealing with these concepts of problems at this table, and I wish you would talk to some of us before we go too far with this.

MR. STONE: I would hope to go one step further than that, Mr. Stein, and that is to recommend a Conference with participation by representatives of the distinguished panelists and also the State Boating Law Administrators through their National Association and the National Sanitation Foundation. I feel if we all sat down around a table and talked these things out that we would have a basis for really getting somewhere here with a cooperative approach.

MR. STEIN: Are there any further comments or questions?

(No response.)

MR. STEIN: If not, thank you very much, Mr. Stone.

Mr. Klassen.

MR. KLASSEN: The next presentation, from the Cook County Clean Streams Committee by

Joseph Chantigney.

I might say for the benefit of our out-of-State visitors, many years ago we--and I say this--we on the State level, promoted clean streams associations. Many of them have lived to heckle us and prod us, but that is all beside the point. The Cook County one was the first one and they are doing a whale of a job.

Joe, I understand only by title you are also going to read the Isaak Walton League presentation.

This is a very short statement, Mr. Chairman, by the Cook County Clean Streams Commission.

STATEMENT OF JOSEPH CHANTIGNEY
CHAIRMAN OF THE GREAT LAKES
FOR THE ISAAK WALTON LEAGUE OF AMERICA

MR. CHANTIGNEY: Yes, sir, Mr. Klassen. Thank you very much.

Mr. Chairman and distinguished guests.

My name is Joseph Chantigney. I am Chairman of the Great Lakes for the Izaak Walton

League of America. I am also Chairman of the Clean Streams Committee for the Calumet Region Chapter of the Izaak Walton League. My Co-Chairman, Mr. Dean Campbell, and I are submitting the following statement. I would like to add that the Cook County Clean Streams Committee, of which I am General Vice-Chairman, also shares the views expressed in this statement.

I would like to start out by saying we wholeheartedly agree with Secretary Udall's statement, which I quote:

"No resource problem in the country is more important than the saving of Lake Michigan."

And also Mr. H. W. Poston's remark in which he said, and I quote:

"I look on this as the biggest enforcement action ever taken. It is the first time we ever covered an entire lake."

If we are to save Lake Michigan, it is an absolute necessity that all four States involved exert their full cooperation to accomplish this tremendous task. It is our opinion that Lake Michigan is following in the footsteps of Lake Erie. We feel that our lake is being used for the wrong purpose. The purpose it is being used for today is mainly the disposal of our municipal and industrial wastes, and what makes this a moral problem is that Lake Michigan is our "drinking cup". Does one State or one group of people have the moral right to contaminate the natural resources of another State or group of people?

Illinois was fortunate in early recognizing that industrial wastes and sewage were a threat to her beaches and drinking water. Thanks to the bold imagination and engineering feats of the Metropolitan Sanitary District of Greater Chicago, our beaches are usable today. We do not suggest that other States concerned can use the same corrective measures, but we do assume that the other States concerned can and will employ whatever measures are necessary to accomplish a clean Lake Michigan. The widespread pollution of Lake Michigan is depriving hundreds of thousands, and potentially millions, of people from enjoying this vast body of water for recreational purposes. These people are entitled to enjoy this water, but on beach after beach signs are posted saying, "Positively no swimming allowed - water polluted."

This shared body of water was once looked upon by primitive people as a communal property. Can we view it with less intelligence than those ancient people? How long can we maintain our present beaches without having to eventually post pollution signs? Despite major engineering feats, the beaches of Illinois cannot long remain unpolluted without the help of our neighboring States. How long will it be before Illinois will have to post contamination signs saying, "Positively No Swimming - Water Polluted" if the present rate of pollution continues?

It seems ironic that the good citizens of Michigan, Wisconsin and Indiana should have to come to Illinois beaches to swim, while the citizenry of Illinois must visit these States to fish. We feel that the Federal Water Pollution Control Administrations water quality criteria standards will make it possible for Illinoisans to fish here and our three neighboring States to provide their people with fine beach facilities.

The restoration of Lake Michigan will also restore commercial fisheries.

This tremendous cleanup job must begin today; tomorrow may be too late. If we may borrow from a popular TV commercial, which goes as follows, "The trouble with start is to stop," we can reverse this saying to, "The way to stop pollution is to START!"

We want to thank you for the privilege and opportunity to express our views here today Thank you.

(Following statement read by Joseph Chantigney:)

JOINT STATEMENT TO FOUR-STATE
CONFERENCE ON LAKE MICHIGAN POLLUTION
BY THE
COOK COUNTY CLEAN STREAMS COMMITTEE
AND THE ILLINOIS DIVISION
IZAAK WALTON LEAGUE OF AMERICA
January 31, February 1 and 2, 1968

My name is Donald Matschke. I am General Chairman of the Cook County Clean Streams Committee and Water Chairman for the Illinois Division of the Izaak Walton League of America. These organizations have entrusted to me the articulation of their shared thinking concerning our most valuable Lake Michigan.

At the same time, I am gainfully employed as the Director of Environmental Research for a company that markets pollution solution equipment, processes and turnkey installations. My professional life is totally occupied with the elucidation and economic reclamation of the environment problems of today and tomorrow.

What I say here today, however, is my best effort to speak to you about our Lake Michigan consistent with the philosophy of the two lay conservation organizations I represent, namely the Cook County Clean Streams Committee and the Illinois Division of the Izaak Walton League of America. In no sense am I acting as a spokesman for my company.

Before proceeding further, we strongly commend the initiatives of both the State and Federal persons who brought this Conference into being. For the first time the people of Cook County and of Illinois have a forum in which to observe and comment on their lake in context with the other areas in States. It is our understanding that the purpose of this Conference is to generate a plan for the reclamation and maintenance of desirable water quality in Lake Michigan for the mutual benefit of the States here represented. The organizations I represent totally support this purpose.

We have had an opportunity to examine the Conference background information prepared by the Department of the Interior. The variety of sources that contribute to Lake Michigan's problems are indeed many and they are well documented in the background materials. It would be impractical for me to discuss them all here with you today. We are shortly going to comment in some detail on two main thoughts. First, however, we would like to touch briefly on two of the problems referred to in the background survey material. Generally speaking, I believe that we all want to work towards water quality standards for Lake Michigan which are comparable in content and philosophy to those arrived at in the Calumet Area, Indiana-Illinois Conference. In order to achieve these standards, we believe that imaginative solutions to combined sewer problems must be forthcoming together with financial backing and that agricultural agencies might soon have to consider recommending legislation to control soil and nutrient runoff from agricultural land bordering our watercourses. And now to return to our two main thoughts.

A first consideration regarding Lake Michigan water quality that we wish to emphasize is the matter of logical consistency. Logical consistency in enforcement. It has been frustrating to some of us in the Chicago area to attempt to reconcile Federal Enforcement Conferences in the Calumet area with at the same time, an absence of parallel action for other Lake Michigan shore areas. Further, the Chicago Tribune and other news media were primarily responsible for publicizing the public concern over dredging dumping in Lake Michigan which eventually resulted in its termination. It was judicial concern for Lake Michigan that manifested itself in the recent opinion that affirms the appropriateness for the Metropolitan Sanitary District of Greater Chicago to continue to direct their treated secondary effluent away from Lake Michigan. Gentlemen, we suggest that there is a need for an integrated concern for Lake Michigan water quality that demands attention. Perhaps a systems analysis is required, much as was carried forth on the Delaware River and such as is presently contemplated for the Hudson River. By whatever means these problems are placed in their proper perspective, by no thoughtful consideration can there be justification for simple translation of discharges from Lake Michigan to our alternative Illinois River watershed. Any systems approach to Lake Michigan water quality must include the related study of adjoining watersheds when there exists the possibility of water quality impairment in these neighboring watersheds. We thus, campaign as we believe you do, for logical, consistent enforcement.

The second thought we would emphasize perhaps arises from a misunderstanding of terms as presented in the background literature for this Conference. By our interpretation, the word "nutrients", as used on page 67 under the subtitle, "Specific Recommendations" in numbered recommendations 1 and 2, does not include the oxygen demanding residues present in municipal or industrial waters subsequent to secondary treatment or its industrial equivalent. Thus, based on this line of reasoning, no tertiary control of both these solid and dissolved organic residues is provided for, now or in the future, in the Specific Recommendations. Neglecting industrial contributions and considering 1960 census figures of 5.5 million municipal population for the Lake Michigan watershed, these seemingly omitted organic residues conservatively contribute in excess of 100 tons per day of sludge solids to and consume in excess of 100 tons per day of oxygen from the waters of Lake Michigan, every day of the year and year after year. We believe the following facts support our argument for reduction of residual organics beyond secondary or equivalent treatment levels.

1. The organic, oxygen demanding residues are, we believe, among the prime reasons why the Metropolitan Sanitary District of Greater Chicago is not recycling secondary effluents

to Lake Michigan and why the Sanitary District of Lake County, Illinois is planning to remove their effluent discharges from Lake Michigan and why metropolitan areas in general that recycle secondary effluents to Lake Michigan have less than desirable recreation and ecological water environment.

2. The oxygen removed by these secondary residues from Lake Michigan is an order of magnitude greater in amount than was the oxygen removed, also from Lake Michigan, by the organic constituents in the sludge dredged from Indiana Harbor by the Corps of Engineers during their routine year-to-year maintenance programs. Gentlemen, this practice has been stopped by administrative order. How wise then are our secondary or organic residue practices?

3. The State of Illinois has called

for tertiary treatment including residual organic removal to varying degrees, depending on dilution volumes available in her inter and intrastate watercourses. Considering that the bulk of the current in most of Lake Michigan is wind or convective induced and results in essentially total recirculative flow, it would seem that we have a minimum of steady state dilution water available for exploitation. Under these circumstances, the State of Illinois by way of their regulation SWB-15 calls for reduction in the aforesaid residual organic loading by 80 percent through tertiary procedures.

4. Dr. David G. Stephan of the FWPCA has presented incremental costs for advanced waste treatment that include chlorination, order of magnitude organic residual removal and substantial phosphate removal. Total treatment cost is estimated at 18 to

24 cents per thousand gallons as compared with cost of conventional secondary treatment at 8.3 to 11 cents per thousand gallons, for 100 MGD and 15 MGD plants respectively.

5. While, in our interpretation, the Specific Recommendations do not call for residual organic removal, we nevertheless find in the accompanying background text on page 24 in the last two paragraphs reading that promises something more to be required for Lake Michigan to control eutrophication.

In summary, we congratulate you in your purpose for this Conference and on the comprehensive survey of Lake Michigan problems which we especially commend for its excellence. We request you implement the sought objectives with continuous attention to logical and consistent enforcement and recommend a systems study of the Lake Michigan watershed areas if no simpler basis for satisfactory judgments can be found. We strongly recommend higher regard for the water quality of Lake Michigan in view of the lake's ineffectual safe cleaning capabilities as compared with flowing watercourses and, for that reason, we request that you consider now order of magnitude reductions in the pollutant residues present in secondary effluents prior to discharge to Lake Michigan.

Thank you gentlemen, on behalf of the conservation organizations I represent for this opportunity to present our thoughts. We believe and we trust that, as a result of this Conference, the people of the Lake Michigan basin can now look forward to a more valuable water resource for all the many water uses. Such is the goal of the Cook County Clean Streams Committee and of the Izaak Walton League of America.

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MR. CHANTIGNEY: Thank you.

MR. STEIN: Thank you.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, thank you very much.

Mr. Klassen or Mr. Morton.

MR. KLASSEN: We have a statement from the Committee on Lake Michigan Pollution, the Chairman of the Investigative Committee. It is a group, I understand, of North Shore citizens. The statement will be made by Donald J. Bergman, who is the Chairman of the Investigative Committee.

Mr. Bergman, can you condense your statement? We are running out of time and we want to make sure we get everybody on.

STATEMENT OF DONALD J. BERGMAN
CHAIRMAN, INVESTIGATIVE COMMITTEE
COMMITTEE ON LAKE MICHIGAN POLLUTION

MR. BERGMAN: Mr. Chairman, Conferees from Michigan, Indiana, Illinois and Wisconsin.

Ladies and gentlemen. I would like to put my full presentation into the record, but I will condense it to a summary.

The Committee on Lake Michigan Pollution is a group of citizens from the suburban villages north of Chicago, ranging up to Lake Forest, who are interested in preventing the death of the lake.

Activities of the group include encouragement of legislation, discouragement of industrial offenders, and search for local sources of pollution in the various villages.

In making this presentation for the Committee on Lake Michigan Pollution, the writer has drawn upon observations of lake conditions during some 40 years of active boating experience, published reports, Winnetka Water Department data, and articles from the press.

In 1927, at Sherwin Avenue near Evanston, the water was clear and clean. There was no algae growing on the piles supporting the small pier extending out from the Sherwin Hotel. In 1934 racing boats using Wilmette Harbor needed a cleaning at most three or four times a season. To be competitive now, a racing boat moored in the water must be cleaned weekly. Occasionally in the late summer, clumps of dark green foul-smelling algae, a foot or more in diameter, float into the harbor on the current caused by pumping into the sanitary canal running to the south. Water at the beach at Lloyd Park, Winnetka, has a green turbid cast, and stones feel slimy to bare feet.

It seems quite possible that some of those present today may be still alive in the year 2000 and that some of our children or grandchildren now living may see the year 2050. So in self interest, we should give serious consideration, not just to the things which should be done immediately, but also to things which should be planned now for completion in 10 or 20 years to keep Lake Michigan in the condition to which we would like to become accustomed, for ourselves, our children, and for future generations. If this planning is to be really successful, it must be as advanced and on a scale even larger than that which took place before the turn of the century resulting in the formation of the Metropolitan Sanitary District of Chicago, rated as one of the seven modern wonders of engineering.

By the year 2050 the midwest megapolis stretching from Milwaukee to Detroit may be well entrenched, but it is the area from Michigan City to Milwaukee with which we are primarily concerned now. There will be problems enough in both Lake Michigan and Lake Huron due to the heavily populated area reaching from Michigan City to Detroit which must drain to one or the other of the lakes or to Lake Erie because no other drainage basin is available.

Long-range estimates of population and the services they require are subject to much question, but it seems reasonable to think of this area requiring sanitary facilities approximately three times that of the present metropolitan district, which handles domestic sewage of about five and one-half million people and industrial sewage equal to three million more people. To prevent the lower basin of Lake Michigan becoming a nearly stagnant pool of pollution, no sewage effluent from this section of the megapolis should discharge into the lake. This is pointed out by the report of Judge Maris dated December 8, 1966.

The following summary is a suggested list for action. It is divided into two groups, A for immediate action and B for Backlog to be picked up when possible.

A. Proposals for immediate study and action.

1. Investigate the fouling of the lower Lake Michigan basin. It appears that in this area evaporation from the lake surface may be greater than precipitation on the surface plus runoff from tributary watersheds, especially during summer, fall and winter. Hence it becomes a stagnant pool with no cleansing flow through. A coordinated study of records of the various municipal and industrial water plants on both sides of the lake might furnish valuable information. In addition, traverse surveys across the lake and in depth should be made to determine the extent of mixing.

2. All sewage systems in the Lake Michigan runoff area should be improved immediately at least to secondary treatment and target dates

set for tertiary treatment. This applies particularly to the larger communities which now discharge sewage effluent directly into the lake or to streams draining into it.

3. Recover and dispose elsewhere the solids filtered out of raw water by water treatment plants. These are now returned to the lake with additional chemicals and carbon in the filter backwash water.

4. Eliminate as far as possible sources of flood-caused overflow of raw sewage into the lake.

5. Set up control works in the outlet of Lake Huron to maintain the level of Lakes Huron and Michigan as Lake Superior is now controlled. This will prevent excessive lowering of lake level during periods of lower rainfall.

6. To provide an incentive for industry to clean up its own sewage and

air pollution wastes at the source, a law should be passed providing that a portion of the cost of corrective measures for air and/or water pollution be deductible from income taxes.

7. Set regulations or laws stopping or limiting the usage of hard to break down pesticides, herbicides, and so forth, such as DDT. These should be replaced wherever possible by degradable material.

8. Set up control over usage of soluble fertilizers where the excess now drains into the lake.

9. Set up uniform local laws or Federal laws regarding disposal of sewage and pollution from ships and pleasure boats using the Great Lakes Waterway and Lake Michigan.

10. Final responsibility for enforcing compliance with laws and regulations covering pollution and

its disposal must be vested in one agency, either existing now or to be created, so that uniform enforcement is maintained. A multiplicity of small agencies is likely to result in confusion and lack of uniformity.

B. These are proposals for immediate study and later action.

1. Work toward complete removal of all sewage effluent, however treated, in those areas where an alternate drainage basin is reasonably at hand to stop nitrogen and phosphorus enrichment of the lake. This seems possible from Milwaukee to Michigan City.

2. Set up or revise priorities on water usage from Lake Michigan to the following order:

a. Domestic and industrial usage in recreation.

b. Transportation or navigation.

c. Riparian rights. This is the maintenance of the uniform level.

d. Power.

3. Arrange for National and international agreement by which an increased amount of water would be diverted from the Hudson Bay watershed, of which a substantial quantity would be available for use in the southern basin of Lake Michigan.

4. Consider the possibility of utilizing cloud seeding to obtain a greater rainfall on the lower basin of Lake Michigan, especially during the late summer and fall when lake levels normally drop.

5. Obtain international and National agreement on increased water diversion from Lake Michigan to the Mississippi watershed by a substantial amount of the water collected by 3 and 4 above in order to set up a

flow-through condition and prevent
the lower basin becoming a dead sea.

I thank you for the opportunity to make this presentation.

MR. STEIN: Thank you very much, sir.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, thank you very much for your presentation.

(The full statement of Mr. Bergman is as follows:)

REPORT OF THE COMMITTEE ON LAKE MICHIGAN POLLUTION

The Committee on Lake Michigan Pollution is a group of citizens from the suburban villages north of Chicago, ranging up to Lake Forest, who are interested in preventing the death of the lake. Activities of the group include encouragement of legislation, discouragement of industrial offenders, and search for local sources of pollution in the various villages.

In making this presentation for the Committee on Lake Michigan Pollution, the writer has drawn upon observation of lake conditions during some 40 years of active boating experience, published reports, Winnetka Water Department data, and articles from the press.

In 1927, canoeing was still a competitive sport in the Chicago area with three canoe clubs on the Des Plaines River and three very active racing clubs located along the lakeshore at Sherwin Avenue, Lincoln Park, and 79th Street. Now there is one club at Lincoln Park.

At Sherwin Avenue near Evanston the water was clear and clean. There was no algae growing on the piles supporting the small pier extending out from the Sherwin Hotel. In 1934 racing boats using Wilmette Harbor needed a cleaning at most three or four times during a season. To be competitive now, a racing boat moored in the water must be cleaned weekly. Occasionally in the late summer, clumps of dark green, foul-smelling algae, one foot or more in diameter, float into the harbor on the current caused by pumping into the sanitary canal running to the south. Water at the beach at Lloyd Park, Winnetka, has a green turbid cast, and stones feel slimy to bare feet.

During the past three years especially, there has been an increasing plague of dead alewives along the shores of the lake in the early summer. These fish found their way into the Great Lakes by way of the canals and locks from the ocean. Apparently they were originally kept under control by lake trout, but when the lampreys destroyed the trout, the alewives went into a population explosion. Last year it was estimated that over 100 million pounds of alewives drifted to shore, fouling beaches, and creating a major stench. Coho salmon were introduced in northern Lake Michigan to provide a sport fish and to feed on the alewives. It has been estimated that a 20-pound salmon will have eaten 100 pounds of these or other small fish. One source of pollution may be the salmon. After four years in the lake they run upstream to spawn and then die. Are we trading dead alewives for dead salmon?

It seems quite possible that some of those present today may still be alive in the year 2000, and that some of our children or grandchildren now living may see the year 2050. So, in self interest, we should give serious consideration not just to the things which should be done immediately, but also to things which should be planned now for completion in 10 to 20 years to keep Lake Michigan in the condition to which we would like to become accustomed, for ourselves, our children, and for future generations. If this planning is to be really successful it must be as advanced and on a scale even larger than that which took place before the turn of the century resulting in the formation of the Metropolitan Sanitary District of Chicago, rated as one of the seven modern wonders of engineering.

By the year 2050 the Midwest Megapolis stretching from Milwaukee to Detroit may be well entrenched, but it is of the area from Michigan City to Milwaukee with which we are primarily concerned now. There will be problems enough in both Lake Michigan and Lake Huron due to the heavily populated area reaching from Michigan City to Detroit which must drain to one or the other of the lakes or Lake Erie because no other drainage basin is available. Long-range estimates of population and the services they require are subject to much question, but it seems reasonable to think of this area requiring sanitary facilities approximately three times that of the present Metropolitan District, which handles the domestic sewage of about 5.5 million people and industrial sewage equal to 3 million more people. To prevent the lower basin of Lake Michigan becoming a nearly stagnant pool of pollution no sewage effluent from this section of the Megapolis should discharge into the lake. This is pointed out by the report of Judge Maris dated December 8, 1966.

The following summary is a suggested list for action. It is divided into two groups, A for immediate action, and B for backlog to be picked up when possible.

A Proposals for immediate study and action.

1. Investigate the rate of fouling of the lower Lake Michigan basin. It appears that in this area evaporation from the lake surface may be greater than percipitation on the surface plus runoff from tributary watersheds, especially during the

summer, fall and winter. Hence it becomes a stagnant pool with no cleansing flow-through. A coordinated study of records of the various municipal and industrial water plants on both sides of the lake might furnish valuable information. In addition traverse surveys across the lake and in depth should be made to determine the extent of mixing.

2. All sewage systems in the Lake Michigan runoff area should be improved immediately at least to secondary treatment, and target dates set for tertiary treatment. This applies particularly to the larger communities which now discharge sewage effluent directly into the lake or to streams draining into it.

3. Recover and dispose elsewhere the solids filtered out of raw water by water treatment plants. These are now returned to the lake with additional

chemicals and carbon in the filter backwash water.

4. Eliminate as far as possible sources of flood-caused overflow of raw sewage into the lake.

5. Set up control works in the outlet of Lake Huron to maintain the level of Lakes Huron and Michigan as Lake Superior is now controlled. This will prevent excessive lowering of lake level during periods of low rainfall.

6. To provide an incentive for industry to clean up its own sewage and air pollution wastes at the source, a law should be passed providing that a portion of the cost of corrective measures for air and/or water pollution be deductible from income taxes.

7. Set regulations or laws stopping or limiting the usage of hard to break down pesticides, herbicides, etc., such as DDT. These should be

replaced wherever possible by degradable material.

8. Set up control over usage of soluble fertilizers where the excess now drains into the lake.

9. Set up uniform local laws or Federal laws regarding disposal of sewage and pollution from ships and pleasure boats using the Great Lakes Waterway and Lake Michigan.

10. Final responsibility for enforcing compliance with laws and regulations covering pollution and its disposal must be vested in one agency, either existing now or to be created, so that uniform enforcement is maintained. A multiplicity of small agencies is likely to result in confusion and lack of uniformity.

B Proposals for immediate study and later action.

1. Work toward complete removal of all sewage effluent, however treated, in those areas where an alternate

drainage basin is reasonably at hand, to stop nitrogen and phosphorus enrichment of the lake. This seems possible from Milwaukee to Michigan City.

2. Set up or revise present priorities on water usage from Lake Michigan to the following order:

    a. Domestic and industrial usage and recreation,

    b. Transportation(Navigation),

    c. Riparian rights (Maintain uniform level),

    d. Power.

3. Arrange for National and international agreement by which an increased amount of water would be diverted from the Hudson Bay watershed, of which a substantial quantity would be available for use in the southern basin of Lake Michigan.

4. Consider the possibility of utilizing cloud seeding to obtain a greater rainfall on the lower basin of Lake

Michigan, especially during the late summer and fall, when lake levels normally drop.

5. Obtain international and National agreement on increased water diversion from Lake Michigan to the Mississippi watershed by a substantial amount of the water collected by 3 and 4 above in order to set up a flow-through condition and prevent the lower basin becoming a Dead Sea.

Lake Michigan is and must continue to be the source of drinking water for millions of people, and the water source for the industries that support them. It is not a self-renewing stream. Its ratio of surface to volume, and its ability to replace used up oxygen are low in comparison to a stream. Hence it appears vitally important to establish how much pollution has already occurred, and what is the condition of the deep pool of the lake.

An article by Horace P. Ramey, in the February and March 1952 issues of the Midwest

Engineer points out that the average precipitation in the Lake Michigan-Lake Huron area is about 31 inches per year, while the average evaporation from the lake surface is 28 inches per year, based on the period from 1860 to 1924 inclusive. The average annual yield of the two lakes considering direct rainfall, runoff from tributary land area, evaporation, and storage was estimated at 105,400 cfs. The mean monthly local supply to Michigan-Huron ranged between 27,800 cfs in May, and 8,200 cfs in October. For the same period the water yield of Lake Superior ranged between a maximum 175,700 cfs and a negative 10,700 cfs in the month of December when precipitation and runoff from the tributary watershed were less than evaporation.

There is a submerged ridge across Lake Michigan running slightly south of east from Milwaukee. Water depth along this ridge is never more than 300 feet, while the basin to the south goes to a depth of about 575 feet and the north basin runs to almost 900 feet. According to "The Glacial Lakes Around Michigan" a recent publication of the Michigan Conservation Department, this ridge is the continuation of a series of glacial terminal moraines, which are evident in both Wisconsin and Michigan.

Considering the negligible watershed area on the west side of this lower basin, and the small streams running into it from the east shore, it seems evident that the water input is little greater than the direct precipitation. Further, evaporation from the lower basin might well be considerably greater than the average for the whole Michigan-Huron watershed. Consequently, it seems evident that the water yield of the lower basin is negative, especially during the hot, dry summer and fall. During this time the lake level falls quite consistently, and water from the north basin flows down to make up for the excess evaporation. This may be part of the reason for the normally south running current on both sides of the lake.

Surface currents in the lake normally follow the wind, although occasionally in light wind conditions current may be across the wind or even against it for a short time. A strong west or southwest wind tends to blow the surface water across the lake and also may build up a level on the eastern shore with a corresponding drop on the west shore. This is accompanied by subsurface current running in the opposite direction, bring up colder clear water to the swimming beaches, and an abundance of plankton, diatoms, and other small aquatic life to cause filtering problems at water treatment plants.

As evidence of the generally prevailing current to the south there is the build up of sand on the north side of piers or other obstructions along the shoreline. On the east side the water from the St. Joseph River makes a clearly defined turn to the south after leaving the harbor.

The lower basin then merits consideration apart from Lake Michigan as a whole, let alone the overall Michigan-Huron water surface, to prevent stagnation and fouling making it unfit for a drinking water source. More study of the rate of fouling and of the currents seem amply justified. An important project would be the development of an improved and faster test for pollution in water. The presently accepted coliform test takes a matter of three days to run. By the time the results are obtained the water represented by the sample has been run completely through a water treatment plant and has been used by its customers. There also seems to be an exaggerated sense of accuracy and some question as to its reproducibility. Water plants generally use as a control the residual chlorine in the filtered water to make sure it is safe for drinking.

A chart, Figure 1, is attached showing the summer and winter averaged coliform readings of the raw water at the Winnetka, Illinois Water Plant intake. Contrary to expectation, readings for the summer months run considerably lower than for winter. An article in the Chicago Tribune may explain this as resulting from chlorination of sewage effluent by the North Shore Sanitary District during summer months to protect beaches for swimming. The effluent was still there, it just didn't show up in the test.

A2. Improvement of sewage systems in the Lake Michigan runoff area to secondary treatment, with target dates set for tertiary treatment.

There seems to be no argument against this with the exception of cost and time involved.

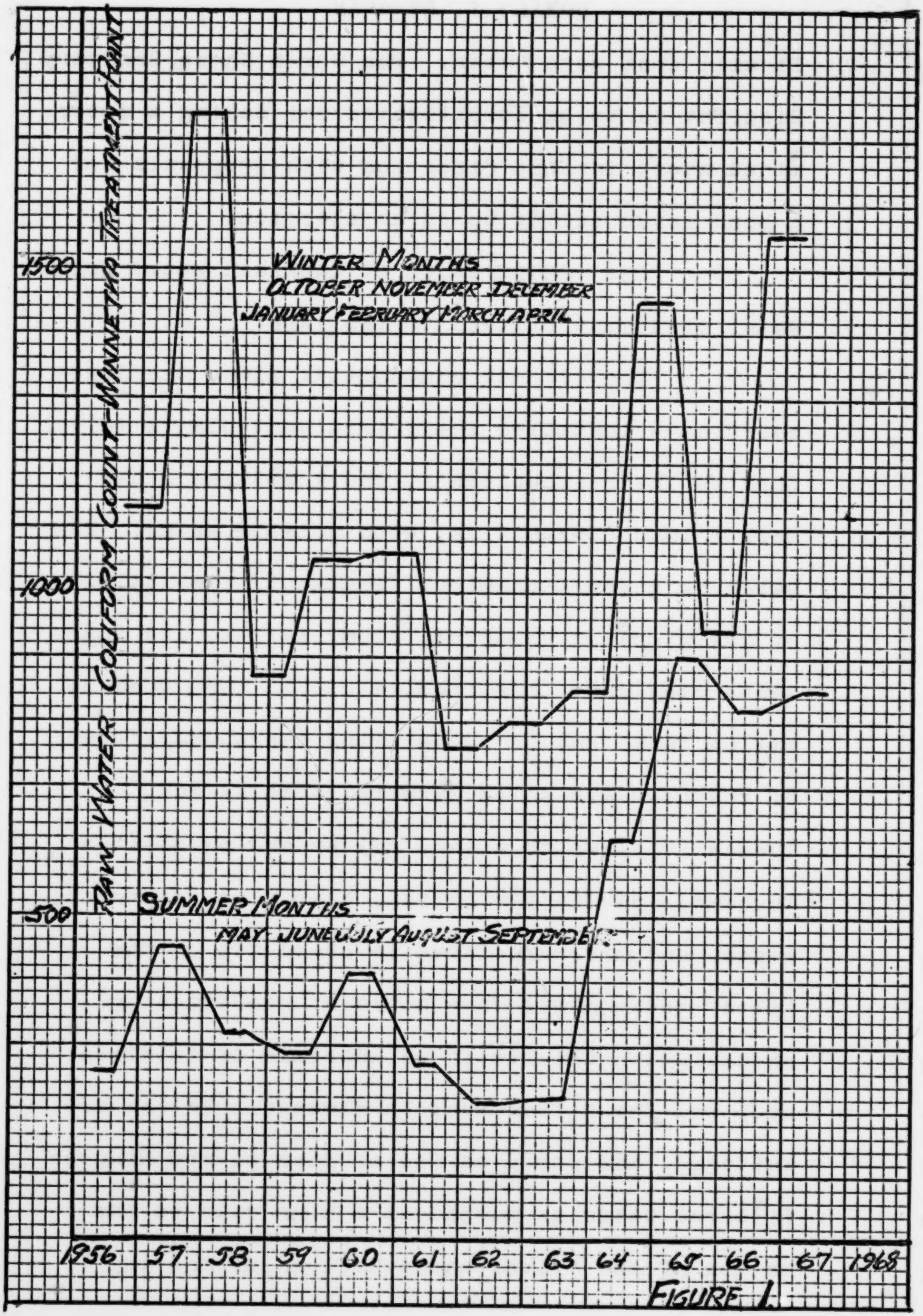
RAW WATER COLIFORM COUNT-WINNETKA TREATMENT POINT
1500
1000
500
WINTER MONTHS
OCTOBER NOVEMBER DECEMBER
JANUARY FEBRUARY MARCH APRIL
SUMMER MONTHS
MAY JUNE JULY AUGUST SEPTEMBER
1956
57
58
59
60
61
62
63
64
65
66
67
1968

FIGURE 1.

It will cost more later. The North Shore Sanitary District is to be complimented for making a determined start in this direction with proposals for a bond issue coming up in an election.

A3. Stop return of backwash water from water treatment filters to the lake.

The various communities along the lakeshore have installed water treatment plants to furnish their inhabitants, and sometimes other more inland communities, with potable water. Raw water is given a chemical treatment, consisting of additions of chlorine, alum, carbon, and sometimes clay and other chemicals. It then goes to mixing tanks and on to settling tanks where some of the heaviest solid material settles out. Thence it flows to a sand filter and percolates through, leaving the carbon, alum floc, protozoa, algae, and microcrustacea in or on top of the filter bed. After some hours of operation the accumulation results in an increase of friction drop and the filter must be cleaned. Valves are switched, and for a period of five to ten minutes filtered water is pumped at a high rate to the bottom of the filter and overflows at the top carrying the accumulated gunk with it. The filter is then ready to resume normal operation. Disposal of the backwash water and the sludge in settling tanks is simple. It just flows back into the lake. This seems to be a universal solution, partly because the high rate of flow while backwashing precludes running to any ordinary sewer system. Rationalization points out that most of the solids came from the lake to begin with.

The Winnetka water plant during the summer months, will pump approximately 10 million gallons daily and return about 200,000 gallons of backwash water to the lake. It is estimated that this contains about one ton of silt, carbon, alum, and organic matter. Then consider Chicago's central water treatment plant. This has a maximem capacity over a million gallons per minute or about 1-1/2 billion gallons per day. For a summer pumpage rate of 1 billion gallons daily, the backwash water contains approximately 100 tons of sludge, now returned to the lake on the opposite side of the building from which the water is drawn in. True, this sludge has been chlorinated and should be inert, but a sample taken during backwashing at Winnetka showed live Daphnia and other life.

Some plants are now searching for means to separate the sludge and dispose it somewhere else. Filtering or longer settling would serve to concentrate the sludge, and the clear water could be returned to the lake in all cases.

4. Flood-caused sewage overflow into lake.

Practically all older communities have combined sewer systems, which quickly become overloaded during heavy rains. To prevent flooding basements there is usually some bypass or high level overflow which relieves the excess--including raw sewage--into the lake. New and larger interceptor lines should be planned to prevent as much of this as possible. To illustrate the effect, the Tribune reprint "Save Our Lake" points out a coliform count at Juneway Beach (north of Howard) as being 17,000 for July 14 through July 17, 1967, and then dropping to 322 on the 18th. The Sanitary District plant at Howard and McCormack registered 0.9 inch rain on July 9, with much smaller amounts at stations farther north. Could this rain have caused an overflow from Evanston's sewer system?

A5. Control level of Lakes Michigan-Huron by works in Lake Huron outlet.

The level of Lake Superior is now controlled within a two-foot range to prevent flooding shore installations during times of high runoff, and maintain navigation with existing channels during fall and winter low runoff. A similar program is necessary for Lake Michigan-Huron to provide full draft navigation channels during low rainfall periods and cut down on alternate storm damage and wide beach exposure during periods of high and low water cycles.

A6. Incentive for industry to correct its own air and water pollution.

Many industries have found that recovery of valuable byproducts from plant wastes can be a profitable end in itself. In other cases some outside incentive or pressure would speed up research as the removal of these wastes at the source is easier and cheaper than combining them all together and turning a complex mess over to a municipal sewage plant.

It therefore seems highly desirable to

push for the enactment of Federal laws similar to those proposed by Congressman Rumsfeld and Senator Percy which would allow a credit against income taxes of a portion of the cost of land, buildings, improvements, machinery, and equipment used to control air pollution and/or water pollution. Where such an incentive would promote action the cost to the taxpayer would be minimal. Where it was not effective, the force of laws prohibiting dumping of wastes is still available and must be made effective. Loss of income to the Internal Revenue Department because of such laws would be more than offset by the generation of new projects and the labor and materials involved would pay taxes at different points.

A7. Regulate or stop use of certain pesticides, herbicides, etc.

There have been numerous fish kills due to accidental or intentional dumping of chemical wastes in streams. A more subtle and insidious source of poisoning comes about from the drainage of residues of pesticides, especially such as DDT, where these have been used in attempts to control insect pests. Dutch Elm disease, spread by beetles, and the destruction caused by Japanese beetles are two good examples. For Dutch Elm disease, dosage of DDT may be as high as 3 to 5 pounds per tree, compared to 1/2 pound per acre for normal spraying. DDT seems to be particularly hard to break down, so the excess winds up draining into streams and lakes. Here it enters at the front end of a food chain, concentrating at each higher level, until an end result has been the death of gulls at Green Bay, and grebes and loons at Clear Lake, California, from eating fish in which the chemical had been concentrated. The sports section of the Chicago Tribune carried a report of heavy kill of Michigan raised coho salmon eggs attributed to DDT in the Sunday edition of January 28, 1968. The use of DDT has been quite widespread since its introduction in the 1940's, and investigations have shown measurable quantities in the fatty tissue of penguins, seals, and fish, and shellfish as far distant as the Antarctic.

Legislation prohibiting the use of DDT in the United States has been proposed by Senator Gaylord Nelson. Other longlasting pesticides can have as serious an effect on wildlife chains, and eventually on man. Research leading to control of usage or banning use of such materials is badly needed. Other chemicals having a shorter life should be used for orchard spraying, mosquito abatement, Japanese beetle, elm beetles, and general farm spraying.

A8. Control of fertilizer use.

While the majority of the nitrogen and phosphorus which causes excessive growth of algae in Lake Michigan comes from sewage effluent and some untreated sewage, some areas receive much of this material as a result of runoff of soluble fertilizer applied to increase crop yields. Use of slow acting fertilizers would reduce this source of lake pollution.

A9. Necessity of uniform State laws or Federal laws Covering pollution.

Last year much publicity was given to a slick of heavy fuel oil found in spots from Lake Calumet to Glencoe. Although much of this publicity was pointed toward oil refinery pollution in the Lake Calumet area, it seems quite improbable that this could be the source. The prevailing currents run toward the south, and the slick was discovered as a widespread thing, not a slowly advancing wind moved layer of oil. Hence it seems much more probable that it was the result of a ship pumping out bilges or fuel tanks before arriving in port to take on a new load of fuel.

The incident does point up the necessity of greater surveillance and enforcement of existing laws against dumping such material in the lakes. One result of the outcry over this incident has been the Chicago ordinance prohibiting the use on boats of toilets which can be flushed into the lake. It seems unlikely that this can be enforced against ocean-going ships which make Chicago an occasional port of call, so the action will affect primarily small boats used for recreation a few hours a week, contributing in an extremely small way to the problem of lake pollution.

It seems desirable to have greater uniformity in legislation such as this, than can be obtained by each city passing its own laws, each with different requirements. To obtain this just on Lake Michigan requires the cooperation of the four States represented at this Conference. To cover the entire Great Lakes Waterway, as is needed, requires cooperation of additional States and Canadian Provinces in the acceptance of a uniform law. Where the need has been great and was recognized, such a thing has been done as for instance the uniform Boiler Codes of the various States and Provinces of Canada.

A10. One ultimate enforcement agency.

Enforcement as well as the laws dealing with pollution must be uniform. Where numerous agencies on City, State and National levels interpret the law differently or may be lax due to pressure of other duties the result will be failure to detect and enforce. It seems necessary for some Federal agency to have the duty and the power to intervene when failure of a local agency to act results in pollution of the lake. This may be an existing agency or one created for the specific purpose.

Proposals for Immediate Study and Later Action

DONALD J. BERGMAN

B1. For several years, Milwaukee beaches have been closed to swimming. With adequate treatment, a canal connecting to the headwaters of the Des Plaines River and some low lift pumping, Milwaukee sewage effluent could be sent down the Mississippi waterway via the Des Plaines River, making the beaches safe for swimming and at the same time removing a heavy load of the nitrogen and phosphorus enrichment which plays a major part in the buildup of algae growth and turbidity in the lower lake basin. The other urban areas between Chicago and Milwaukee should do the same. The increase of population and industry expected for this area by the 21st Century dictates that decisive measures be taken to protect the health of the communities involved, and the recreational aspect of the lake. A similar case can be made for the area extending to Michigan City connecting up with the Little Calumet River.

B2. Priorities on usage of Lake Michigan water.

The first and most important call on the water available in the Lake Michigan basin must be for domestic and industrial usage and recreation of the population adjoining the lake. This requires further that all communities on the lake or on waterways draining into it construct advanced sewage treatment plants to avoid pollution of the lake.

Second place in priority should go to water transportation. With the increase in population and industry expected, this becomes increasingly more important than at present. Larger and greater draft vessels will have to be accommodated and a vastly greater flow of traffic from the lake to the Mississippi River must be provided for. This will require enlargement of present canal and locking facilities and especially requires maintenance of level on the Lake Michigan-Huron basin.

Third place in priority should be assigned to riparian rights. This again requires control of the level of Lakes Michigan and Huron.

Fourth place should be assigned to production of power. With the technical advances available in the coming years, more exotic power generating methods than hydraulic turbines will be available. At the present time two nuclear plants are planned for the near future at Zion, Illinois. Furthermore, control of water level at the outlet of Lake Huron will result in reducing the flow to the lower lakes and Niagara River in the fall and winter and increasing the flow in the spring. One answer to this would be provision of pumped storage to care for peak loads.

B3. Arrange for increased diversion from Hudson Bay watershed to Lake Superior.

Since 1939 there has been some diversion of water from the Hudson Bay watershed to Lake Superior. This is under control and can be discontinued at times of high water. It amounted to over 5,000 cfs on the average between 1945 and 1950. In view of the steadily increasing need for clean fresh water around the southern end of Lake Michigan, arrangements should be made to obtain a much larger quantity. In any such arrangement, regardless of who pays the bill, some will be reserved for Canadian interests. However, a substantial part should be available for use in the southern basin of Lake Michigan, without necessarily finally flowing through the Niagara River. This whole problem is similar to that which has resulted in the building of the wide-flung Los Angeles water system.

B4. Stimulation of greater rainfall.

Cloud seeding as a means of increasing rainfall during times of drought has not been uniformly successful, but there has been evidence that under favorable conditions a considerable increase in rainfall can be achieved. Legal problems might arise through claims of loss due to induced rain and perhaps also on the part of areas which might have received more rain were clouds not seeded. However, it appears that seeding of clouds during passage across Lake Michigan from the southwest might raise the annual rainfall on its basin by 20 percent or about 6 inches. Assuming that the "made" rain fell on only a 5,000 square mile area, this still amounts to more than 4,000 cfs. average over the year. This would appear to be within the spirit of the ruling by Judge Maris by which the State of Illinois is under the duty of employing all those means which are practical and reasonably available to it for conserving its own water resources before seeking to take additional water from Lake Michigan. That ruling apparently did not envision or eliminate the use of additional water obtained from sources not naturally available at the time of the ruling.

B5. Possibility of increased water diversion from Lake Michigan to the extent of water added from other sources.

The Parsons-Jurden Company of Los Angeles has drafted preliminary plans for an ambitious redistribution of water resources from areas where they are in excess to areas where they are in short supply. The basic plan is to use present waterways as far as possible, with tunnels, dams, canals, pumps and power recovery all employed. Much of the water would come from Canadian sources, and international agreement on such arrangements would be necessary. In the same spirit it is proposed that National and international agreement be reached by which a substantial part of water added to the Great Lakes, either by diversion from other watersheds or from such activities as cloud seeding, be made available for diversion from the Chicago area to break the stagnation of the lower basin of Lake Michigan and to improve navigation.

January 29, 1968

Committee on Lake Michigan
Pollution

Donald J. Bergman, PhD.,P.E.

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MR. KLASSEN: There has been a dearth, Mr. Chairman, of comments by the ladies and the water users. We have a very brief statement here that will be given by Mrs. Eileen Johnston. I admit I am a little prejudiced, but she is speaking for the alumni of one of the great universities in the world, the University of Michigan. You might guess, my alma mater.

Mrs. Johnston.

STATEMENT OF MRS. EILEEN L. JOHNSTON
PRESIDENT, NORTH SHORE
UNIVERSITY OF MICHIGAN ALUMNI CLUB

MRS. JOHNSTON: Mr. Klassen has just talked himself into a membership in our North

Shore Club, which has now been extended to include Springfield.

Mr. Stein and Conferees, my name is Eileen Johnston of Wilmette, Illinois. This statement is being made on behalf of the North Shore University of Michigan Alumni Club. We welcome you to Chicago. We have spent so many days in conference with you gentlemen that we feel like we are old friends.

We wish to thank Governor Kerner for requesting this important Conference, and to thank Secretary Udall for making it possible for the States of Michigan, Indiana, Wisconsin and Illinois to meet together and work on this serious problem of pollution in Lake Michigan that has been neglected all these years.

Our Alumni Club Board has been aware of the gross pollution in Lake Michigan and we have held meetings to educate our membership and interested parties about the unbelievable condition of the lake today and about research that is being done to help combat the many problems that different kinds of pollution confront us with.

We are very much interested in the reserach being done at various universities, for surely we need much more knowledge of eutrophication, sludge disposal, currents, the effect of thermal pollution, cheaper methods of removal of nutrients from wastewater, work on the vast amounts of algae growth and more study of the alewife, etc.

We need more trained people in the field of water pollution control. A number of universities, aided by Federal funds, have graduate students helping to carry on valuable research on such problems as listed above. At the same time, they are preparing themselves to work in a field that is crying for trained personnel. I was deeply concerned when Lt. Governor Olds of Michigan announced that funds were being cut back for the Great Lakes Research Division at Ann Arbor, Michigan. We learned at this Conference that outstanding research has been done at this division, and it would be a step backwards in the fight on pollution if this work was halted.

We must restore all of Lake Michigan to pure water, including its tributaries. This wonderful lake is actually one big well for the use of the people of four States and it should be treated as such. Who would throw sewerage, chemicals, oil, heat, pesticides down the well and expect to survive?

No individual, Federal installation, State installation, municipality or industry has the right to put anything into our source of water--the lake. Lake Michigan is not the four State dump for municipal and industrial wastes, pesticides, thermal pollution, boat wastes, and so forth.

Let's clean up this big well, then keep it that way. We are making progress with legislation. With proper enforcement and continued research we should be able to do the job.

The public needs education. We need a new value put on our most valuable resource throughout the Nation. It is going to cost us money for pure water. Let's face it and go to work. We need a slogan perhaps to keep us all aware of our responsibility.

We hope that every effort will be made to maintain and even expand present levels of research and training in sanitary and water resources engineering and related departments at all schools, and especially where going programs have developed such as exist at the University of Michigan.

I thank you for the opportunity to speak as a citizen of Illinois.

MR. STEIN: Thank you, Mrs. Johnston.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, thank you very much for your statement.

(The following material was submitted by Mrs. Johnston:)

Secretary Udall and Conferees, my name is Bruce E. Johnston, of Wilmette, Illinois. I am a student at the University of Kansas.

In 1959 as Boy Scouts, my patrol members and I took a 12-mile hike along the shore of Lake Michigan from Highland Park to Wilmette Harbor. The purpose of the hike was to seek out illegal sewer pipes with effluent that was polluting the lake. Roughly 20 such pipes were found and located on a geological map of the area. This project was done at the suggestion of Mr. Gordon Wallace, Park Superintendent of Wilmette, and Mr. Lawrence Langdon, President of the Wilmette Park Board at the time. A copy of the map and a report was sent to Mr. Frank Chesrow, President of the Metropolitan Sanitary District at the time, and to Mr. Kehr, of the United States Public Health Service in Chicago. We checked our work with another hike to be sure we had not missed any pipes.

While walking along the beach last summer much to my disappointment I learned that the sewer pipes we had located nine years earlier still existed. I feel that a good deal of pollution could have been stopped if someone had taken our work and interest in the condition of the lake seriously and had done something about it all those years ago. This spring when my friends get home from college we plan to redo the hike and again plot the violators.

Respectfully submitted

(Signed) Bruce E. Johnston

EILEEN L. JOHNSTON

Bruce E. Johnston
505 Maple Avenue
Wilmette, Illinois 60091
1/31/68

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MR. KLASSEN: Mr. Chairman, in conformance with the agreed-upon procedure that the State of Indiana take over at 3 o'clock, I just want to make a couple minutes summary for the State of Illinois.

I first of all want to say that we have a statement here that will go into the record from Congressman Robert McClory. And to a few of you here who so far have not been able to get on because of time limitations, we are passing your statements out to the Conferees and they will go into the record. I will say that if there is time at the end of this session I assume you will be given an opportunity to present your statements if you so desire. I can only apologize for the very few who so far haven't been able to get on, but your statements will be in the record.

STATEMENT OF THE HONORABLE ROBERT MC CLORY

U. S. HOUSE OF REPRESENTATIVES

12th CONGRESSIONAL DISTRICT OF ILLINOIS

CONGRESSMAN ROBERT MC CLORY

FEDERAL-STATE ENFORCEMENT CONFERENCE
TO SPEED THE CLEANUP OF LAKE MICHIGAN
Statement of
The Honorable Robert McClory, Representative
12th Congressional District of Illinois
February 2, 1968

Mr. Secretary, Lake Michigan is one of our Nation's most precious assets. For years it has been a valuable part of the geography of the midwest. It has been a vital element in this area's economic growth. Lake Michigan affords opportunities for recreation to millions of our citizens principally from Illinois, Indiana, Michigan and Wisconsin.

But today the advantages of the lake are threatened by pollution. Lake Michigan is sick. Quick and effective action must be taken to save this great and beautiful body of water. The convening of this Conference is consistent with the need for action. I congratulate you, Mr. Secretary. In addition, I offer my full cooperation in seeking ways and means to eliminate pollution from Lake Michigan. In taking this position, I am confident that I reflect the sentiments of the citizens of the 12th Congressional District of Illinois.

The residents of the 12th District enjoy over 20 miles of Lake Michigan shoreline. Seven communities in this area border the lake including Winthrop Harbor (At the Wisconsin border), Zion, Waukegan, North Chicago, Lake Bluff, Lake Forest and Highland Park (At the Cook County line).

In addition to the residents of these seven communities, many other citizens use and enjoy the lake. Also, two important installations of the Federal Government are located on this shoreline: Fort Sheridan (which includes the 5th U. S. Army Headquarters) and Great Lakes Naval Training Station, largest naval training center in the world.

To all, the plight of Lake Michigan is a matter of the deepest concern. Fortunately, public interest is high. This is due,to a considerable extent, to the attention focused on the perils of water pollution by a series of penetrating and factual newspaper articles which appeared in the Waukegan News-Sun, the Chicago

Tribune, and in some other Chicago newspapers. In addition, leaders of local, State and national government are responding to the public clamor for action. Initiative is being demonstrated by industry and private citizens as well.

My purpose in presenting this statement is twofold:

First, I wish to encourage a full and forthright analysis of the entire problem.

Second, I wish to present for the consideration of the Conference several recommendations upon which the Conferees may wish to express themselves in their report.

Before making these recommendations, I wish to comment on the complexity of Lake Michigan problems.

Multiple uses are made of the waters of Lake Michigan. The lake's vital waters sustain the municipal, industrial, commercial and recreational life of millions of our citizens. Lake Michigan attracts bathers, boat owners and fishermen. Communities draw fresh water from the lake. Industries and municipalities use the lake for water and as a reservoir into which treated waste effluent and industrial wastes are introduced. Commercial shiplines ply her deep waters.

Yet none of these varied uses, and none of the users should in fairness be allowed to jeopardize the enjoyment by others of this great water resource. Balanced, responsible and non-detrimental use should be practiced by all. Certainly, offenders must be brought into line.

And may I add that it is not man alone who has damaged Lake Michigan. There are natural causes of pollution which also contribute to the condition of this lake.

Last summer the dieoff of the alewife fish attracted our attention. In August I participated in Congressional hearings held in Washington and at East Chicago, Indiana, to consider the alewife crisis. Expectations are that another gigantic alewife dieoff will occur in the summer of 1968 despite efforts to solve the problem. The massive death of this silvery fish and the ensuing contamination of the Lake Michigan shoreline present a new challenge to our efforts at control. The resulting pollution of the beaches and shorelines, and the clogging of municipal water intakes by dead fish is obnoxious, offensive and dangerous to public health.

I am confident that the public is prepared to guard Lake Michigan against this new source of pollution. The need for natural ecological balance in Lake Michigan must be recognized. Earnest consideration should be given to ecological balance by the introduction of predator fish who will prey on the alewife and reduce its numbers.

Municipal and industrial pollution of the lake must end promptly.

Strict laws and regulations to prevent dumping of wastes by commercial and private boats and ships must be enacted and enforced. We can no longer tolerate large or small oil slicks in our lake.

With respect to sources of pollution relating primarily to the area embraced in Illinois 12th Congressional District (Lake and McHenry Counties and Barrington and Hanover Townships in Cook County) I will make several observations:

1. I am pleased to report that the Lake

County communities along the Illinois shore of Lake Michigan are taking action to reduce the introduction of their treated sewage plant effluents into the lake. The North Shore Sanitary District, which serves the communities which adjoin the Lake County, Illinois, shoreline, has an important project estimated to cost about $58 million. When completed, this development will result in a transfer of these effluents from Lake Michigan to the Des Plaines River (which empties ultimately into the Mississippi River). A referendum on a proposed bond issue has been set tentatively for May 4, at which time the residents will be asked to assume an obligation of about $35 million.*

An additional or possibly alternative proposal contemplates a $75 million bond issue secured by the full faith and credit of Lake County and in which the Lake County Public Works Department would participate. This would seem to offer an opportunity to eliminate municipal sewage effluents from Lake Michigan and also to provide sewage treatment facilities for additional portions of Lake County.

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* The North Shore Sanitary District serves a zone about 4-5 miles wide extending from the Wisconsin line down to the Cook County line and including the communities of Winthrop Harbor, Zion, Waukegan, North Chicago, Park City, Lake Bluff, Lake Forest, Highwood, and Highland Park, as well as a part of Gurnee.

I am confident that the residents of Lake County will face up to their responsibilities buoyed by the knowledge that others who enjoy the use of Lake Michigan also will be cooperating in the efforts to save our lake. I hope that a recommendation in support of the North Shore Sanitary District or alternative Lake County, Illinois, proposal will be included in the report of the Conferees.

2. With respect to the industries which may be contributing to the pollution of Lake Michigan, I would agree that corrective action must be taken promptly by such industries. However, in order to encourage and assist such action, I recommend that the Conference consider the subject of tax incentives.

It seems to me that legislation should

CONGRESSMAN ROBERT MC CLORY

be enacted by the Congress to provide for an increased investment credit or rapid depreciation or other favorable treatment under the Federal Income Tax Laws for those industries that make outlays for pollution control plants and equipment. I have introduced a bill (H.R. 4883) to permit industries to take a tax credit on their Federal Income Tax return to encourage the construction of waste treatment facilities. I urge the Conference to consider this device and to endorse the tax incentive concept.

On the subject of incentives, I am sure that someone will suggest the further use of outright grants by Federal Government to local and State Governments and possibly to private industries as a way of stimulating action. Well-intentioned as the Federal grant method may be, the effect of a grant program often is to discourage, rather than encourage, local or individual initiative.

With respect to the existing municipal grant program, I have observed that local action sometimes is deferred while application is made for the Federal grant. Further delay occurs during the long and complicated processing period in one or more regional and Washington offices of the Federal Government.

Far better it seems to me would be the tax credit or rapid depreciation method or other favorable treatment under the Federal income tax laws. To allow such a tax incentive would involve no delay, no long wait for Federal approval and the availability of Federal funds, but would encourage immediate action. I am hopeful that this Conference will take a long step forward with a strong recommendation for the use of tax incentives for industry to battle pollution now.

3. There is a great need for the development of new techniques to treat and dispose of waste material. Little technical progress at all has been made in the last 50 years in this vital field.

4. Serious attention should be given to the prevalence of individual septic systems in the four States bordering Lake Michigan. Private septic systems are common and often

contribute to the water pollution problem. While it may be that pollution from most septic systems enters streams, rivers and small lakes, these conditions adversely affect the condition of Lake Michigan. I recommend that the Conference consider the dangers posed by private septic systems.

5. The Conference should study the effect of waste practices by Federal Government instrumentalities such as Great Lakes and Fort Sheridan on the health of Lake Michigan. Specific recommendations should be made concerning the waste treatment systems in operation at these and other Federal facilities. The recent Executive Order of President Johnson should not become an empty promise. It must be implemented by a meaningful program to end pollution of Lake Michigan by Federal installations consistent with State and Federal water quality standards.

Mr. Secretary, it is my hope that the five recommendations contained in this statement will contribute to the success of this Federal-State Enforcement Conference to speed up the cleanup of Lake Michigan. All of us have much at stake in the saving of wonderful Lake Michigan.

Future generations will be grateful for the action we take now.

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SUMMARY STATEMENT OF C. W. KLASSEN
TECHNICAL SECRETARY
THE ILLINOIS SANITARY WATER BOARD

MR. KLASSEN: Just as a quick windup and summary for the State of Illinois, we will file for the record some recommendations that I am sure will be considered along with the other States recommendations by the Conferees in their final report. I merely want to very briefly touch on what these recommendations include.

It will recommend that the four States adopt uniform criteria for Lake Michigan for open waters, shore waters and harbor basins.

Two, and this to us is extremely important, that there be adopted a definition of pollution. There is none in the Federal Act. This is something I feel that we should adopt, because depending upon with whom you talk depends on their interpretation of what they think pollution really is.

Then there should be some agreement on base terminology to define treatment, if it is secondary treatment a certain percentage, primary treatment, tertiary treatment, and so forth.

Recommendation No. 4 will include some discharge characteristics. For example, when we talk about dissolved solids, phosphates, chlorides, temperatures, the various heavy metals, exactly what do we mean?

Then industrial waste treatment in Recommendation No. 5, some comparable language so that industries will know and will be assured that what they will have to do will be comparable to what is being required by municipalities.

Then No. 6 is admittedly a controversial one, but one that we think should go in, a definite time schedule. I want to read this at this time. This is what we are suggesting:

> Municipal effluent disinfection during the recreational months to go into effect the spring of 1969.
>
> Municipalities with sewers but no

treatment facilities, if there are any, there are not in Illinois, December 1969.

Municipalities with primary facilities only by December 1969.

Municipalities with storm flow bypassing at treatment works July 1972. This is completion dates.

Municipalities with automatic storm overflow of combined sewers, solution by July 1977.

Municipalities nutrient control facilities by the latest 1977, and earlier if facilities and methods are available.

Industrial waste treatment and control--I want to repeat that; this is Illinois recommendation--industrial waste treatment and control December 1968. That is a State law in Illinois.

The deadline for meeting the marine or watercraft problem. This is something that we want to negotiate, I am sure, between the Conferees.

We have a whole recommendation on this question of marine vessel sanitation, one on shore and harbor maintenance operation so far as debris, another one on lake dumping, and one on the tributary streams going into Lake Michigan that they should meet the water quality criteria so that the incoming flow will not contribute to the degradation of Lake Michigan.

I think, Mr. Chairman, that this concludes our formal presentation. I want to add about one moment's worth of personal comment.

At a later time when the Federal Government finally reaches a point that they give their conclusions and recommendations on their report, I want to make comment on that. But there has been much talk, much public image gathering by legislators of State and Congressional, by associations, by people. This was the subject of a very excellent editorial in one of the Chicago papers in the last few days, I think it was "Don't Go Away." The legislators particularly I want to comment on for just a couple of seconds.

It is one thing to appear here and give a fine public image that you are for clean water. Yet so far as the Illinois Legislature is concerned, the last three sessions of our Legislature, including the one that has just concluded, turned down our request for additional funds for water pollution control. I hope that there will be a little reverse of this in the next session.

The same thing can be said of the Congress on not funding. I just came from a session where Senator Muskie said he had every reason to believe that Congress was going to fully fund the Federal authorization. We have to see this.

Now to the associations that have been here. It is fine to get up and talk about what you are for, and I can only speak for our own Legislature. I have yet to see in my 40-some years of experience in Illinois any of these clean water conservation groups appear before a committee on appropriations to speak for the local water pollution control agencies in their

State. I think the four men sitting up here particularly from the State are all faced with identical problems. We need money; we need a realistic personnel code so that we can not only hire people but retain the people. And we need a positive enforcement program.

A final word to the people that have been here individually. On a national television program several months ago I made this statement, that I have yet to know of anyone, with all of this talking about clean water, that has ever contacted an industry in which they are a stockholder and advocated that they spend money for water pollution control, even though it reduces their dividend. I got one letter from a man up in Maine who sent me a copy of the letter he sent to his corporation. People say, what can we do? I think this is one of the things you can do.

And I want to end up, I don't want to steal any of Jim Vaughn's good sayings, but this is paraphrasing a Negro spiritual, which goes something like this, that everyone that talks about heaven ain't going there. I say this, everybody that talks about water pollution control just ain't doing their part.

Thank you.

MR. STEIN: Thank you, Mr. Klassen.

(Applause.)

(Mr. Klassen's entire summary is as follows:)

ILLINOIS SANITARY WATER BOARD
RECOMMENDATIONS
WATER QUALITY CRITERIA AND IMPLEMENTATION
LAKE MICHIGAN FOUR-STATE CONFERENCE
JANUARY 31, 1968
C. W. KLASSEN, TECHNICAL SECRETARY

The Illinois Sanitary Water Board offers the following recommendations in regards to water quality criteria, waste treatment and effluent criteria, schedule for treatment works construction, marine vessel sanitation, and shore or harbor maintenance operations as applied to Lake Michigan, for consideration by this Conference.

Background

Water quality criteria for Lower Lake

Michigan (Cook County, Illinois and Lake & Porter Counties, Indiana) were prepared by a Technical Advisory Committee, chairmaned by Federal Water Pollution Control Administration. The Committee was appointed by the Conferees at the Illinois-Indiana Conference on pollution of interstate waters of Lake Michigan and Calumet areas under provisions of Section 8, Federal Water Pollution Control Act (33 USC 466 et. seq.) March 2-9, 1965.

The report and recommended water quality criteria were accepted by the Conferees February 1, 1966 and approved by the Acting Secretary of Health, Education and Welfare April 15, 1966. Subsequently the Indiana Stream Pollution Control Board adopted these criteria as part of the Indiana water quality standards for Lake Michigan waters. These standards were approved by the Secretary of Interior. Illinois Sanitary Water Board also adopted these criteria as part of the Illinois water quality standards for Lake Michigan.

Bases for Development of Criteria

Quoted from the Technical Committee Report as follows:

"After considering various bases for development of water quality criteria the committee agreed that criteria should be based on:

1. Present and potential water uses.

2. Preservation of present good quality.

3. Improvement of degraded quality where technically and economically feasible.

4. Reconsideration and revision of regular intervals as future developments may dictate.

"It was concluded that adoption of uniform criteria for specific uses, regardless of location of uses, would not provide a practical basis for a pollution abatement program for lake waters. For example, the sheltered areas between the Calumet Harbor Breakwater and the Indiana Harbor Bulkhead receives the major discharges from waste sources. Obviously, it is impractical to expect water of the same high quality in this area, regardless of the degree of waste treatment achieved, as that which will be found several miles out in the open lake. If the sources of municipal supply in the sheltered area are given adequate protection, the water in the open lake inevitably will be of still better quality.

"Based on this reasoning, the water area of the lower lake was divided into three zones..... Most of the water area is defined as Open Water, which is that area more than 200 yards offshore and outside of a line from the outer end of the Calumet Harbor Breakwater to and along the outer edge of the Inland Steel Bulkhead Line and thence through the U. S. Steel Water Supply intake to the outer end of the Gary Harbor Breakwater. The Inner Harbor Basins is the area shoreward of the above line, but not including Shore Water. Shore Water is all water within 200 yards of existing onshore recreational areas.

"General water use categories were adopted for the development of criteria. These water uses are:

1. Municipal Water
2. Industrial Water
3. Recreation
    a. Whole Body Contact

b. Limited Body Contact

4. Fish and Wildlife

5. Commercial Shipping

6. Esthetics

7. Wastewater Assimilation."

A copy of the printed "Report of Water Quality Criteria Calumet Area-Lower Lake Michigan, January 1966" is enclosed for the record, but not necessarily for inclusion in the transcript of this Conference.

(Which said document, entitled, "Report of Water Quality Criteria Calumet Area-Lower Lake Michigan, January 1966," is marked as Conference Exhibit No. 9, 2/5/68, and is on file at the Federal Water Pollution Control Administration Office in Washington, D. C., with a copy on file at the Regional Office of the FWPCA in Chicago, Illinois.)

Recommendation 1 - Water Quality Criteria

The Illinois Sanitary Water Board recommends and requests that the delegated representatives to this Four State Conference on Pollution of Lake Michigan adopt these water quality criteria for all of Lake Michigan. The three sets of criteria to be considered are for Open Water, Shore Water and Harbor Basins. These criteria, when adopted, shall supplement individual State Water Quality Standards for respective State Areas or in event any individual criteria is more stringent than State Standards, the more stringent criterion shall govern.

Recommendation 2 - Definition of Pollution

There are understandably differences between lay and official usage and interpretation of the word pollution. It is recommended that the definition of pollution proposed by the U. S. Department of Health, Education and Welfare be adopted by this Conference. This definition was contained in Section 2 (a) of Suggested State Water Pollution Control Act Revised, GPO 890-028, May 1965 and is as follows:

"Pollution means such contamination, or other alteration of the physical, chemical or biological properties, of any waters of the State, including change in temperature, taste, color, turbidity, or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the State as will or is likely to create a nuisance or render such waters harmful, detrimental or injurious to public health, safety or welfare or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life."

A supplemental definition might include the following: Water pollution is the specific impairment of water quality to a degree that has an adverse effect upon any beneficial use of water yet does not necessarily create an actual hazard to the public health. If there is no impairment of desired use by the presence or addition of any factor, there is no pollution.

Recommendation 3 - Degree of Waste Treatment

This Conference should agree on base terminology and define treatment in terms of concentration. Thus if secondary treatment by at least 80 percent is based on average strength raw waste at 200 mg/l, the allowable effluent will be 40 mg/l. Suspended solids based on average raw waste at 240 mg/l would yield 48 mg/l in the effluent. Treatment should include year round disinfection of effluents.

A minimum of secondary treatment of municipal wastes has been requested by Federal Water Pollution Control Administration and included by States in water quality standards. Some standards have defined secondary treatment as removal of organic material in terms of BOD by at least 80 percent in a trickling filter plant or by at least 90 percent in an activated sludge plant. This percent is usually interpreted in terms of normal domestic sewage which may have a range of 200 to 300 milligrams per liter five-day biochemical oxygen demand. Thus a filter plant effluent could range from 40 to 60 mg/l and the activated sludge plant effluent could range from 20 to 30 mg/l.

Recommendation 4 - Discharge Characteristics

Similarly definite values for chemical and other constituents of effluents should be established, for example:

matching grant funds in 1967 and 1968 and 4.95 million dollars for '68-69. We understand the budget request for the Federal budget is for $225 million. Unless the Federal Government fulfills its commitment by appropriating the authorized monies, the municipal construction program will not keep pace with the schedules and the plan of implementation. All sewered municipalities are to provide secondary treatment and chlorination by the end of 1972.

The eight industries in the St. Joseph River Basin with inadequate treatment facilities will be required to provide adequate treatment by the end of 1969.

Pollution

The sources of pollution in the St. Joseph River Basin are municipal sewage, combined sewer overflows, and industrial wastes.

All but four sewered municipalities (less than 2 percent of the sewered population) in the St. Joseph River Basin provide sewage treatment facilities. Of the 13 municipalities providing sewage treatment, 11 have secondary treatment. The Cities of Elkhart and Ligonier need to expand primary treatment facilities by adding secondary treatment. Mishawaka and South Bend need plant expansion and effluent chlorination is needed at South Bend.

The Indiana Stream Pollution Control Board in 1964 mandated that South Bend provide effluent chlorination and an engineering study of sewage works improvement needs. However, the city has appealed the Board's order and this litigation is now pending in the Starke Circuit Court. Plans for chlorination facilities for South Bend have been approved. Plans for sewage works expansion have been submitted by South Bend, Elkhart, and Ligonier.

While the present concentrations of phosphate in the St. Joseph River are not considered significant due to the adequacy of dilution water, it may be necessary in the future for South Bend, Mishawaka, and Elkhart to provide phosphate removal as part of their treatment. Because of conditions in lakes below Angloa and Kendallville, it will be necessary for these municipalities to provide nutrient removal.

I might say that this report was prepared in 1966 and we are now willing to agree that nutrient removal is needed at these plants to protect Lake Michigan.

There are 22 industries in the St. Joseph River Basin which handle a significant volume of waste. Seven of these industries provide treatment facilities with soil absorption of the effluent and, therefore, have no outlet to a receiving stream. The remaining 15 industries discharge treated effluents directly into streams of the basin, and of these there are eight that do not have adequate treatment. The appendix shows the type and status of treatment facilities. The industries listed as inadequate have been advised by the Board to abate pollution.

Another pollution problem of the basin is the bacteriological pollution of the St. Joseph River caused by treated municipal sewage and combined sewer overflows from South Bend, Mishawaka, and Elkhart. There are some locations in the river with slightly depressed bottom fauna due to sludge deposits.

Summary of Water Uses

1. All waters in the basin will be required to support a well-balanced, warn-water fish population and must be suitable for agricultural uses.

2. All waters, where natural temperatures permit, will be required to support put-and-take trout fishing.

3. All reservoirs and lakes in the basin and the St. Joseph River must be maintained for whole body contact recreation and all other streams for partial body contact recreation, such as boating, canoeing, and fishing.

4. All waters which are used for public or industrial water supply must meet said criteria, and where needed for this purpose in the future will meet the criteria.

Implementation and Enforcement Plan

The Board adopted SPC 1R as the standard of water quality for the waters of the St. Joseph

River Basin. All waters, based on the use concept, will be required to meet the standards, for the appropriate public and industrial water supply, aquatic life, recreational, and agricultural uses mentioned previously. Compliance with these standards will enhance the quality of waters within this basin. In existing high quality waters every effort will be made to maintain high quality consistent with the powers granted under the Indiana Act.

The Board will require construction of municipal treatment facilities in accordance with the following timetable:

1. Secondary treatment facilities are to be provided by the City of Elkhart by the end of 1969 and by the City of Ligonier by the end of 1972. Said facilities are to include effluent chlorination. Both cities have submitted plans for plant additions.

2. Expansion of secondary treatment facilities will be required by South Bend and Mishawaka

by the end of 1972. South Bend has submitted plans for plant expansion.

3. South Bend is to provide effluent chlorination facilities as soon as practicable. Ashley, Goshen, and LaGrange are to provide effluent chlorination by the end of 1972.

4. Treatment facilities, including effluent chlorination, are to be provided by Cromwell, Milford Junction, Topeka, and Wakarusa on or before the end of 1972.

5. Installation of advanced waste treatment or provision for low flow augmentation will be required at Angola within the next 10 years. Phosphate removal will be required at Angola and Kendallville as soon as practicable methods are developed.

The eight industries in the basin with inadequate treatment facilities will be required to provide adequate treatment for indicated contaminants by the following time schedule:

The end of 1968, Weatherhead Corporation, Angola.

The end of 1969, Bristol Band Instrument Company, Bristol;

Continental Can Company, Elkhart;

New York Central System, Elkhart;

Penn Electric Switch Company, Goshen;

Middlebury Cooperative Creamery, Inc., Middlebury;

New Paris Creamery Company, New Paris;

Gentner Packing Company, South Bend.

I might say here that the Federal Report also has eight industries, but the last five differ between those in their report and the ones in our report:

The Elkhart Packing Company has no discharge, according to inspections made in 1967;

McCray Refrigerator Company, Kendallville, and Bendix Corporation, South Bend, both discharge their wastes to municipal sewer systems.

The Price Duck Farms at Milford, starting in 1966 raised ducks on channels with no discharge to the stream, and the Slabaugh Duck Farms at Milford no longer raises ducks and this is shown by inspections in 1966 and 1967.

Summar.

1. Completion of the programs outlined herein will greatly enhance the water quality of the extreme south end of Lake Michigan and the St. Joseph River Basin. However, some sources of pollution, i.e., nutrients, oil, wastes from watercraft, dredged materials, and dead alewives, require additional study and a general agreement by all concerned on programs to provide the necessary control.

2. Mandatory certification of plant operators, both municipal and industrial, will improve the efficiency of treatment plants and reduce accidental discharges.

Here I would like to add that the General Assembly in 1967 enacted a law requiring mandatory certification of both municipal and industrial treatment works.

3. Additional studies are needed to develop plant scale projects to effect phosphate and other nutrient removals. Significant sources of nutrients, aside from that measured in sewage treatment plant effluent, need to be determined and methods developed for effective control. Nutrient removal will be required of major sources as soon as practicable methods are developed.

4. The discharge of oil from lake-going vessels and miscellaneous sources must be abated. Strengthened Federal legislation on oil pollution will be helpful. However, there will always be accidents or "Acts of God" which will require more effective surveillance, the development of a warning system, and the development of practicable control procedures

which can be put into effect quickly.

5. Pollution caused by the discharge of wastes from watercraft, including untreated sewage, ballast and bilge water, litter and garbage, and oil, requires additional attention. The Indiana Boating Law prohibits the discharge of human waste from boats on all Indiana waters except Lake Michigan. It will be recommended to the 1969 General Assembly that the law be amended to include Lake Michigan waters.

6. The States should support Federal legislation to regulate pollution by commercial vessels engaged in interstate commerce and each State should provide for uniform regulation of pollution by recreational watercraft.

7. The pollution caused by dumping of dredged materials in Lake Michigan must be controlled. On August 16, 1966, the Indiana Stream Pollution Control Board adopted a

policy opposing the dumping in Lake Michigan of dredged material which contains substances that are polluting in character, whether they be of organic material or of petroleum sources. It is recognized dredging of harbors must continue in order to maintain navigation. There should be close cooperation by the States and other affected agencies with the Corps of Engineers in its pilot program. It is recommended that a timetable for the discontinuance of disposal in the lake of dredged materials which are polluting in character be adopted which is similar to the timetables established for municipalities and industries.

8. The alewife problem requires immediate attention to effect satisfactory disposal of dead alewives that are anticipated in the summer of 1968. Measures must be developed and put in operation to abate the alewife population

explosion. As this problem is pertinent to all the Great Lakes, effective control measures should be initiated by appropriate Federal agencies with the cooperation of State agencies.

9. In addition to the current problems in Lake Michigan, many future problems of pollution can be avoided or minimized through a program of coordinated and comprehensive planning for the development of the water resources of the Great Lakes Basin. The newly-created Great Lakes Basin Commission, of which all the Great Lakes States and involved departments of the Federal Government are members, appears to be the proper vehicle for such coordination.

Thank you.

MR. STEIN: Thank you very much, Mr. Miller.

(Applause.)

(Which said report, with attached tables and maps, is as follows:)

PERRY MILLER

FOR CONFERENCE
ON
LAKE MICHIGAN

CALLED BY
SECRETARY STEWART L. UDALL
DEPARTMENT OF THE INTERIOR

STARTING JANUARY 31, 1968
CHICAGO, ILLINOIS

ON BEHALF OF THE
INDIANA STREAM POLLUTION CONTROL BOARD
AND
THE STATE OF INDIANA

JANUARY 1968

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PERRY MILLER

Introduction

In accordance with the requirements of the Federal Water Quality Act of 1965, Indiana undertook the adoption of updated water quality standards in 1966. Pursuant to the provisions of Chapter 120, Acts of 1945, public hearings were held on proposed standards in river basins throughout the State. The proposed standards and plans for implementation, which included proposed timetables, were mailed to municipalities, industries, adjacent States, the Federal Water Pollution Control Administration, and others prior to the hearings. At the public hearing for the Lake Michigan Basin, the Illinois Sanitary Water Board endorsed the proposed criteria as consistent with those adopted by Illinois. The proposed timetables were not questioned by Illinois or the Federal Water Pollution Control Administration. At the public hearing for the St. Joseph River Basin, the State of Michigan agreed with proposed criteria but offered the comment that the MPN/100 ml coliform index would be unrealistic during periods of stormwater runoff. Following the hearings, Regulations SPC 1R, SPC 4, SPC 5, SPC 6, SPC 7, SPC 8, SPC 9, and SPC 10 and implementation plans for the respective basins were adopted by the Stream Pollution Control Board as Indiana's new water quality standards and submitted to the Department of the Interior for consideration of approval. Secretary Udall notified Governor Branigin on July 18, 1967, that he had approved the Indiana Water Quality Standards.

The implementation plans for the respective basins provide background information, cite specific pollution sources, enumerate water uses and provide a timetable for municipalities and industries to complete construction of necessary facilities.

The following report includes the status of municipal and industrial waste pollution abatement and control measures in the Lake Michigan drainage area of Lake, Porter, and LaPorte Counties and in the St. Joseph River Basin. Much of the material is excerpted from the Indiana plan submitted to the Department of the Interior. Where necessary it has been updated.

PERRY MILLER

Description of Basin

Geography

The Lake Michigan drainage basin is located in the northwestern corner of the State and covers an area of 615 square miles including portions of Lake, Porter, LaPorte, and St. Joseph Counties. The basin averages 15 miles in width and curves around the southern tip of Lake Michigan for a distance of about 50 miles; and it is bounded on the north by the State of Michigan; on the south by the Kankakee River Basin; and on the west by the State of Illinois.

Population

The northern portions of Lake and Porter Counties have experienced a tremendous rate of growth since the turn of the century. Lake County alone has, during this period, shown an increase of 1,250 percent. The plentiful supply of water available from Lake Michigan; industrial development; excellent highways; railroads; waterway transportation arteries; and the Chicago urban area are a few factors stimulating this phenomenal growth. It should be noted that 84 percent of the Lake

County population is located in the upper third of the county along the shores of Lake Michigan and the major watercourses of the basin. The estimated 1960 population of the Lake Michigan Basin in Indiana was 620,588.

Water Quality

At present, the Stream Pollution Control Board and the Indiana State Board of Health operate 15 water quality monitoring stations in the basin. There are four located on Burns Ditch near Portage; four on the Grand Calumet River (one at Hammond, two at East Chicago and one at Gary); three on the Indiana Harbor Canal in East Chicago; two on Lake Michigan (one each at the Michigan City and Whiting water supply intakes); one on the Little Calumet River in Hammond; and one at Wolf Lake at the culvert at the state line.

Pollution

The principal sources of pollution in the basin in Idnaian are industrial wastes, municipal sewage, and combined sewer overflows. Other wastes discharged intermittently may have serious local effects or may cause temporary excessive pollution. Among these wastes are accidental spills from storage tanks and barges; wastes from lake vessels, barge tows and pleasure craft; and materials from dredging operations.

All sewered municipalities have some combined sewers which contribute to pollution during periods of storm. Combined sewer overflows contribute gross bacterial pollution, high suspended solids concentrations, and heavy BOD loadings. Industrial waste present in such systems contribute to the pollution problem. Phosphates and other nutrients contribute to algae growth in receiving waters.

The water quality in the Open Water of Lake Michigan is excellent with the exception of periods of high threshold odors and increased concentrations of ammonia-nitrogen caused by industrial wastes.

Shore water east of the Inner Harbor Basin is of good quality and generally satisfactory for whole body contact recreation. However, shore water within the Inner Harbor Basin is of poor quality which is attributed to combined sewer overflows and wastes discharges in this basin. The Front Street combined sewer overflow at

Whiting at times discharges untreated sewage directly to Lake Michigan, and the Atchison Avenue stormwater pumping station in Whiting and the Robertsdale stormwater pumping station in Hammond discharge stormwater overflow from combined sewers to Lake Michigan. In addition, stormwater overflows from East Chicago and Gary to the Grand Calumet River and the Indiana Harbor Canal contribute to the poor water quality. Reduction of combined sewer overflows or control facilities including disinfection of storm overflows will be necessary.

The Inner Harbor Basin water quality is generally satisfactory. However, there are intermittent periods of high threshold odor, ammonia-nitrogen, phenols, and coliform bacteria. This pollution is the result of direct discharges to the lake from sewers and the flow from the Indiana Harbor Canal.

Waters of the Indiana Harbor Canal and the Grand Calumet River are unsightly and characterized by floating debris, oil, discoloration, and high suspended solids loading. These waters are industrial process and cooling water, treated and chlorinated effluents from the Gary and East Chicago Sanitary Districts treatment plants and combined sewer overflows. The 26 industries with direct discharges to the Grand Calumet River, Indiana Harbor Canal or Lake Michigan waters and the status of their waste treatment or control facilities are shown in the appendix. Further treatment of industrial wastes is necessary to enhance the water quality and to meet the standards for the Grand Calumet River, Indiana Harbor Canal and Lake Michigan waters.

Water quality is generally good in the Little Calumet River-Burns Ditch-Lake Michigan drainage area. Provision of sewage treatment plants, disinfection of effluents, treatment of all industrial wastes, and improved soil conservation measures to reduce pollution from agricultural runoff are needed to meet the water quality criteria. Water quality in Trail Creek is generally poor due to high bacterial counts resulting from combined sewer overflows during periods of storm and from the bypassing of raw sewage at the Michigan City sewage treatment plant. Michigan City will complete construction in 1968 of a project to provide additions, including effluent chlorination, to its activated sludge plant for a design capacity of 15 mgd.

Summary of Water Uses

1. Lake Michigan open water and Inner Harbor Basin water will be required to be suitable for public and industrial water supply, maintenance of a well-balanced, warm-water fish population, water-oriented recreation and will also be required to meet the standards as set forth in Regulations SPC 4 and SPC 6, respectively.
2. Lake Michigan shore water, including the three existing bathing beaches located in the Inner Harbor area, and Wolf Lake will be required to be suitable for maintenance of a well-balanced, warm-water fish population, whole body contact recreational activities and will also be required to meet the standards set forth in Regulations SPC 5 and SPC 10, respectively.

3. The Grand Calumet River and Indiana Harbor Canal serve as sources of industrial water supplies and must meet the standards set forth in Regulations SPC 8 and SPC 7, respectively.

4. The Little Calumet River-Burns Ditch and tributaries and other streams flowing to Lake Michigan will be required to support a well-balanced, warm-water fish population, be suitable for partial body contact recreation, and agricultural uses, and meet the standards as set forth in Regulation SPC 1R.

Implementation and Enforcement Plan

The Board will require construction of municipal treatment facilities in accordance with the following timetable:

1. The Town of Porter is to provide treatment facilities as soon as practicable in compliance with the outstanding Stream Pollution Control Board order. The Attorney General has filed for enforcement

action in the Porter County Circuit Court. Plans are underway for treatment of sewage from Porter at the Chesterton sewage treatment plant.

2. Expansion of treatment facilities will be required by Hammond and by Valparaiso on or before the end of 1972.

3. Installation of advanced waste treatment will be required at East Chicago, Gary, Hammond, and Michigan City as soon as practicable and at Crown Point, Hobart, and Valparaiso within the next 10 years. East Chicago has completed preliminary pilot plant operation of advanced waste treatment methods and is embarking on the second phase of advanced waste treatment studies. Nutrient removal will be required as a part of advanced waste treatment. The smaller municipalities in the basin may also be required to provide an advanced degree of treatment to meet water quality criteria.

4. Installation of sewers and sewage treatment will be required within the next 10 years for most of the incorporated communities with public water supplies and no recognized sewer system. This includes Beverly Shores, Dune Acres, Long Beach, Michiana Shores, New Chicago, Ogden Dunes, Portage, and the Town of Pines.

5. The municipalities of Hammond and Whiting will be required to provide treatment and disinfection of sewage and stormwater overflows from the Robertsdale, Atchison Avenue and Front Street outlets to Lake Michigan on or before the end of 1970. (In December 1967, Hammond authorized an engineering study of sewer separation in the Robertsdale area.) The municipalities of East Chicago, Gary, Hammond, and Michigan City with storm and/or combined sewer overflows will be required to provide disinfection

and control of pollution from these overflows as soon as practicable.

The industries in the basin which have inadequate control or treatment facilities will have to provide them as shown in the following listing:

1. Completion of construction by the end of 1968.

    a. E. I. du Pont de Nemours and Company, Inc., East Chicago

    *b. Adolph Plating, Inc., East Chicago

    *c. M & T Chemicals, Inc.,East Chicago

    *d. Industrial Tissue Division, Georgia-Pacific Corporation, Gary

    e. American Maize-Products Company, Hammond

    f. American Chemicals Company, Griffith

    g. Phillips Drill Company, Michigan City

    h. Gary Tube Works, U.S. Steel Corporation, Gary

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* On December 19, 1967, the Board issued a final order to the Adolph Plating, Inc., East Chicago, to abate pollution of the Grand Calumet River by the end of 1968. The order requires preliminary plans by

March 1, 1968, and final plans by June 1, 1968.

On December 19, 1967, the Board scheduled administrative hearings with the M & T Chemicals, Inc., for pollution of the Indiana Harbor Ship Canal and with the Industrial Tissue Division, Georgia-Pacific Corporation, Gary, for pollution of the Grand Calumet River. M & T Chemicals, Inc., obtained an agreement with the East Chicago Sanitary District for connection to the District's sewerage system and has agreed that the connection will be made by July 31, 1968, but in any event no later than December 31, 1968. The hearing with Georgia-Pacific Corporation was held on January 17, 1968. The hearing officer's findings and recommendations should be completed soon.

2. Cities Service Oil Company, Mobil Oil Company, Sinclair Refining Company, American Oil Company, and Union Carbide Chemicals Company will have to provide timetables for construction of additional waste treatment facilities to control BOD, oil, and threshold odor substances, which are consistent

with the requirements of the Conference on Pollution of the Grand Calumet River, Little Calumet River, Calumet River, Wolf Lake, Lake Michigan, and tributaries. The conclusions and recommendations of the Conferees established December 1968, as the latest date for completion of water pollution abatement facilities by industry except for a few industries where variation is justified and approved by the Board and Conferees.

3. The original timetable was June 30, 1970, for completion of all the necessary pollution abatement facilities by Inland Steel Company, Youngstown Sheet and Tube Company, and U. S. Steel Corporation's Gary Tube Works, Gary Steel Works, and Gary Sheet and Tin Mill. However, the schedule has been reexamined and new construction timetables established.

PERRY MILLER

The new timetables and companies' estimates of the percentage reduction of contaminants to meet established criteria are as follows:

FACILITIES PROPOSED AND UNDER CONSTRUCTION

United States Steel Corporation
Gary Tube Works, Gary, Indiana

Project	Contaminants to be Removed	Old Completion Date	New Completion Date
1. Waste pickle liquor collection system. No discharge to receiving stream.	Acid and iron	12/31/67	Completed
2. Solids clarification and oil skimming facilities.	Oil and suspended solids	12/31/68	12/31/68

United States Steel Corporation
Gary Steel Works, Gary, Indiana

Project	Contaminants to be Removed	Old Completion Date	New Completion Date
1. Coke Plant - Permanent connection of Coke Plant wastes into the Gary Sanitary District sewerage system and in-plant controls and waste separation.	Ammonia, cyanide, phenols, oils, BOD, and suspended solids	12/31/69	12/31/68
2. Blast Furnace Area - Additional settling basins for flue dust, oil separators in power station and waste segregation.	Oils and suspended solids	6/30/70	12/1 /69
3. Steel Making Area - Construction of oil separators and segregation of wastewater with discharge to Blast Furnace Area flue dust settling basins.	Oil and suspended solids	6/30/70	12/31/69
4. Hot Mills Area - Construction of sewers, sumps, pumps, piping, and settling and oil skimming basins.	Oil and suspended solids	6/30/70	12/31/69

United States Steel Corporation
Gary Sheet and Tin Mill, Gary, Indiana

Project	Contaminants to be Removed	Old Completion Date	New Completion Date
1. 6-Stand Tandem Cold Reduction Mill facilities.	Suspended solids, free oils, emulsified oils, BOD, and iron	--	Completed

FACILITIES PROPOSED AND UNDER CONSTRUCTION (continued)

	Project	Contaminants to be Removed	Old Completion Date	New Completion Date
2.	84-inch Hot Strip Mill filtration facility.	Suspended solids, oils, and iron	--	Completed
3.	Deep Well disposal system. No discharge to receiving stream.	Acidity and iron	--	Completed
4.	Acid rinse waters from the existing Sheet and Tin Mill 66-inch Continuous Pickling Line and the New 84-inch Continuous Pickling Line will be diverted to the existing 6-Stand Tandem Cold Reduction Mill waste treatment plant.	Iron, acidity, and suspended solids	12/31/68	6/ 1/68
5.	Oily wastewater from the 80-inch 5-Stand Cold Reduction Mill treatment plant will be diverted to the 6-Stand Tandem Cold Reduction Mill waste treatment plant.	Suspended solids, free oils, emulsified oils, and iron	6/30/68	6/15/68
*6.	Segregated wastewater from Tin Mill will be discharged to the existing 6-Stand Tandem Cold Reduction Mill waste treatment plant.	Iron, suspended solids, free oils, emulsified oils, and BOD	12/31/69	6/30/69
*7.	Segregated wastewater from Sheet Mill will be discharged to the expanded 6-Stand Tandem Cold Reduction Mill waste treatment facilities.	Iron, suspended solids, free oils, emulsified oils, and BOD	3/30/70	6/30/69
*8.	Wastewater from the 80-inch Hot Strip Mill scale pits will be diverted to the expanded 84-inch Hot Strip Mill Filtration Plant.	Iron, suspended solids, and oils	6/30/70	3/ 1/70

* In order to handle the additional waste loadings listed in Items No. 6 and No. 7, additional primary solids and oil skimming, flocculation-clarification, and oil and solids handling facilities will be constructed at the 6-Stand Tandem Cold Reduction Mill waste treatment facilities (Terminal Treatment Plant). Additional filtration facilities will be added to the 84-inch Hot Strip Mill waste treatment plant to handle the waste load listed in Item No. 8. The expansion of both the Terminal Treatment Plant and the Hot Strip Mill will be completed by March 1, 1970.

FACILITIES PROPOSED AND UNDER CONSTRUCTION (continued)

Youngstown Sheet and Tube Company
East Chicago, Indiana

	Project	Contaminants to be Removed	Old Completion Date	New Completion Date
1.	Coke Plant - Construction of napthalene scrubbers and connection of waste to the East Chicago Sanitary District.	Ammonia, cyanide, phenols, oils, BOD, and suspended solids	--	Completed
2.	No. 2 Open Hearth - Clarification facilities, cooling towers and water reuse system. No discharge to receiving stream.	Oil and suspended solids	12/31/67	Completed
3.	No. 3 Hot Strip Mill - Oil and solids removal, chemical flocculation, scale pits, and filtration facilities.	Free oil, emulsified oil, suspended solids, and iron	3/1/68	3/1/68
4.	Buttweld Mill - Pressure filters	Oil and suspended solids	12/31/68	12/31/68
5.	No. 1 Tin Mill - Sumps, pumps, and sewers to collect oily waste.	Oils	12/31/68	12/31/68
6.	No. 1 Tin Mill, No. 2 Tin Mill and No. 2 Cold Reduced Sheet Mill - Central Water Treatment Plant for chemical treatment of oils and suspended solids.	Oils and suspended solids	12/31/69	12/31/69
7.	Hot Rolling Mills - Terminal lagoon for secondary clarification of effluent from lake front scale pit.	Oils and suspended solids	6/30/69	6/30/69
8.	No. 2 Cold Reduced Sheet Mill - Sumps, pumps, and sewers to collect waste pickle liquor; and sumps, pumps, and sewers to collect oily waste.	Acidity, suspended solids, oils and iron	12/31/69	12/31/69

most of the burbot, wiping out the fishing industry at the south end of the lake. Then the alewife displaced the lake herring, and the bloater increased. Thus rough fish with little market value supplanted the fish which supported the fishing industry. The present trend toward an "all alewife" lake is the final step. Even if the introduction of the coho salmon to feed on alewife is successful beyond expectations, the destruction of the ecology of Lake Michigan is a national disgrace. Taxpayers had a right to expect that this prized resource, the Great Lakes, was being protected by governmental agencies.

Similarly, the deaths of approximately 15,000 gulls and 6,500 loons in 1963 and 1964 were symptomatic of the deteriorating lake. I alerted the U. S. Public Health Service Great Lakes-Illinois River Basin Project and the U. S. Fish and Wildlife Service. To this day it is not certain what killed these birds.

Mr. Poston's report in 1965 (U. S. Public Health Service, Division of Water Supply and Pollution Control) on pollution in the Calumet Area came as a shock. Quite unknown to the public, several steel and oil companies in that area have been dumping a carload of oil into the lake daily, plus large quantities of cyanide, sulfuric acid and phenols. Fatal nitrate-phosphate enrichment is betrayed by algae, which increases annually.

How these companies could, along with the U. S. Army Engineers, dumping their river dredgings in the lake, ever imagine that these operations would not in time destroy the lake, is difficult to comprehend. Protestations of ignorance of the natural world in which they live strike a sour note when they come from the brilliant leaders of our largest corporations. I do not believe them. These are ruthless corporations that have regarded free enterprise as a hunting license. They have invited Federal control of the most stringent kind and the public will not rest until the water standards set are complied with.

I have not been in favor of giving industry more time to clean up its operations and I am not in favor of letting the taxpayer pay the bill. What industry has done to a priceless natural resource that belongs to millions of people is criminal. The officials of these corporations are fortunate that they are merely being required to correct the situation instead of being prosecuted.

Nor is it enough to cease polluting Lake Michigan and the other Great Lakes. It solves nothing if Chicago sends the equivalent of the raw sewage of several hundred thousand people down the Illinois waterway or if the north shore communities stop dumping sewage into the lake, only to run it out of the Des Plaines River.

Our ignorance of or disregard for the needs of the natural world we all depend on is unforgiveable. It marks the greatest failure of an educational system that is already justifiably under scrutiny. Natural wastes in a state of nature are broken down by insects, bacteria and fungi to be recycled as usable chemical nutrients into the ecosystem. Technology must solve the problem of breaking down human and industrial wastes for recycling into the ecosystem or else it will not be possible to live in large cities.

Man depends on green plants to mobilize the sun's energy. A disaster like the sinking of the oil tanker Torrey Canyon destroyed the wildlife of much of the British and French coasts. If it had been a tanker of DDT most of the oxygen-producing capacity of our planet (represented by the diatoms of the sea) might have been wiped out. Shipping on Lake Michigan must be carefully policed against dumping any waste.

It is an enormous job we have made for ourselves but it is the most important one in the world. It is a matter of survival.

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INDIANA PRESENTATION

MR. STEIN: We will go on to Indiana without a recess.

I would like to call one procedural point to your attention, because I know the Conferees are going to look at Mr. Klassen's recommendations and particularly time schedule very carefully. That item on municipal nutrient control facilities December 1977. I suggest that that be looked at in the light of Dr. Weinberger's testimony here.

MR. KLASSEN: Yes.

MR. STEIN: I am just flagging that. No comment.

MR. KLASSEN: This is real good. We did not have the privilege of hearing Dr. Weinberger's paper and I might say, as you know, he is a person that we have the greatest respect for.

MR. STEIN: Right. Thank you very much.

May we move right along and see if we can have the Indiana statement.

INDIANA PRESENTATION

INDIANA PRESENTATION

MR. POOLE: Mr. Chairman, since you said move right along, I am going to introduce Perry Miller, who is Assistant Director of our Engineering Division, who will present the statement for the Indiana Stream Pollution Control Board.

Perry Miller.

STATEMENT OF PERRY MILLER
ASSISTANT DIRECTOR, ENGINEERING DIVISION
INDIANA STREAM POLLUTION CONTROL BOARD

MR. MILLER: Mr. Chairman, Conferees, ladies and gentlemen.

In accordance with the requirements of the Federal Water Quality Act of 1965, Indiana undertook the adoption of updated water quality standards in 1966. Pursuant to the provisions of Chapter 120, Acts of 1945, public hearings were held on proposed standards in river basins throughout the State. The proposed standards and plans for implementation, which included proposed timetables, were mailed to municipalities, industries, adjacent States, the Federal Water Pollution Control

Administration, and others prior to the hearings. At the public hearing for the Lake Michigan basin, the Illinois Sanitary Water Board endorsed the proposed criteria as consistent with those adopted by Illinois. The proposed timetables were not questioned by Illinois or the Federal Water Pollution Control Administration. At the public hearing for the St. Joseph River Basin, the State of Michigan agreed with proposed criteria but offered the comment that the MPN/100 ml coliform index would be unrealistic during periods of stormwater runoff. Following the hearings, Regulations SPC 1R, SPC 4, SPC 5, SPC 6, SPC 7, SPC 8, SPC 9, and SPC 10 and implementation plans for the respective basins were adopted by the Stream Pollution Control Board as Indiana's new water quality standards and submitted to the Department of the Interior for consideration of approval. Secretary Udall notified Governor Branigin on July 18, 1967, that he had approved the Indiana Water Quality Standards.

The implementation plans for the respective basins provide background information, cite specific pollution sources, enumerate water uses and provide a timetable for municipalities and industries to complete construction of necessary facilities.

The following report includes the status of municipal and industrial waste pollution abatement and control measures in the Lake Michigan drainage area of Lake, Porter, and LaPorte Counties and in the St. Joseph River Basin. Much of the material is excerpted from the Indiana plan submitted to the Department of the Interior. Where necessary it has been updated.

Lake Michigan Basin - Indiana
Status of Pollution Abatement

All sewered municipalities on the Lake Michigan watershed in Lake, Porter, and LaPorte Counties now provide secondary treatment and effluent chlorination, except the Town of Porter (population 2,189). Porter is under a Stream Pollution Control Board order and a suit for enforcement has been filed in the Porter County Circuit Court by the Attorney General. A tentative agreement has been reached by the Towns of Porter and Chesterton for treatment of sewage from Porter at the Chesterton treatment plant. The Indiana plan approved by Secretary Udall calls for advanced waste treatment at East Chicago, Gary, Hammond, and Michigan City as soon as practicable and by Crown Point, Hobart, and Valparaiso within 10 years. This will include nutrient removal. The four large cities will be required to disinfect combined sewer overflows as soon as practicable with Hammond and Whiting to provide treatment and disinfection of storm and combined sewer overflows, that discharge directly to Lake Michigan, on or before the end of 1970.

All industries are to provide treatment to meet the water quality standards of the Stream Pollution Control Board and the Conferees of the 1965 conference. This is to be accomplished by the Lake Michigan industries within the timetables recommended (December 31, 1968) by the Conferees in the Federal enforcement case except for four steel plants (three companies). These have progressive waste treatment construction programs with the latest completion date being June 30, 1970. Following the reconvening in September 1967 of the 1965 conference and at the request of the Board, the steel industries appeared before the Board and submitted revised timetables. These were subsequently accepted by the Board and they appear later in the report. Except for three small industries, cooperation has been good and most programs are on schedule. Enforcement actions have been initiated where necessary.

The principal sources of pollution in the basin in Indiana are industrial wastes, municipal sewage, and combined sewer overflows. Other wastes discharged intermittently may have serious local effects or may cause temporary excessive pollution. Among these wastes are accidental spills from storage tanks and barges; wastes from lake vessels, barge tows, and pleasure craft; and materials from dredging operations.

All sewered municipalities have some combined sewers which contribute to pollution during periods of storm. Combined sewer overflows contribute gross bacterial pollution, high suspended solids concentrations, and heavy BOD loadings. Industrial waste present in such systems contribute to the pollution problem.

Phosphates and other nutrients contribute to algae growth in receiving waters.

The water quality in the open water of Lake Michigan is excellent with the exception of periods of high threshold odors and increased concentrations of ammonia-nitrogen caused by industrial wastes.

Shore water east of the Inner Harbor Basin is of good quality and generally satisfactory for whole body contact recreation. However, shore water within the Inner Harbor Basin is of poor quality which is attributed to combined sewer overflows and wastes discharges in this basin. The Front Street combined sewer overflow at Whiting at times discharges untreated sewage directly to Lake Michigan, and the Atchison Avenue pumping station is Hammond discharges stormwater overflow from combined sewers to Lake Michigan. In addition, stormwater overflows from East Chicago and Gary to the Grand Calumet River and the Indiana Harbor Canal contribute to the poor water quality. Reduction of combined sewer overflows or control facilities including disinfection of storm overflows will be necessary.

The Inner Harbor Basin water quality is generally satisfactory. However, there are intermittent periods of high threshold odor, ammonia-nitrogen, phenols, and coliform bacteria. This pollution is the result of direct discharges to the lake from sewers and the flow from the Indiana Harbor Canal.

Waters of the Indiana Harbor Canal and the Grand Calumet River are unsightly and characterized by floating debris, oil, discoloration, and high suspended solids loading. These waters are industrial process and cooling water, treated and chlorinated effluents from the Gary and East Chicago Sanitary Districts treatment plants and combined sewer overflows. The 26 industries with direct discharges to the Grand Calumet River, Indiana Harbor Canal or Lake Michigan waters and the status of their waste treatment or control facilities are shown in the appendix. Further treatment of industrial wastes is necessary to enhance the water quality and to meet the standards for the Grand Calumet River, Indiana Harbor Canal and Lake Michigan waters.

Water quality is generally good in the

Little Calumet River-Burns Ditch-Lake Michigan drainage area. Provision of sewage treatment by the Town of Porter, improved operation of sewage treatment plants, disinfection of effluents, treatment of all industrial wastes, and improved soil conservation measures to reduce pollution from agricultural runoff are needed to meet the water quality criteria. Water quality in Trail Creek is generally poor due to high bacterial counts resulting from combined sewer oveflows during periods of storm and from the bypassing of raw sewage at the Michigan City sewage treatment plant. Michigan City will complete construction in 1968 of a project to provide additions, including effluent chlorination, to its activated sludge plant for a design capacity of 15 MGD.

Summary of Water Uses

1. Lake Michigan open water and Inner Harbor Basin water will be required to be suitable for public and industrial water supply, maintenance of a well-balanced, warm-water

fish population, water-oriented recreation and will also be required to meet the standards as set forth in Regulations SPC 4 and SPC 6, respectively.

2. Lake Michigan shore water, including the three existing bathing beaches located in the Inner Harbor area, and Wolf Lake will be required to be suitable for maintenance of a well-balanced, warm-water fish population, whole body contact recreational activities and will also be required to meet the standards set forth in Regulations SPC 5 and SPC 10, respectively.

3. The Grand Calumet River and Indiana Harbor Canal serve as sources of industrial water supplies and must meet the standards set forth in Regulations SPC 8 and SPC 7, respectively.

4. The Little Calumet River-Burns Ditch and tributaries and other streams flowing to Lake Michigan

will be required to support a well-balanced, warm-water fish population, be suitable for partial body contact recreation, and agricultural uses, and meet the standards as set forth in Regulation SPC 1R.

Implementation and Enforcement Plan

The Board will require construction of municipal treatment facilities in accordance with the following timetable:

1. The Town of Porter is to provide treatment facilities as soon as practicable in compliance with the outstanding Stream Pollution Control Board order. The Attorney General has filed for enforcement action in the Porter County Circuit Court. Plans are underway for treatment of sewage from Porter at the Chesterton sewage treatment plant.
2. Expansion of treatment facilities will be required by Hammond and

Valparaiso on or before the end of 1972.

3. Installation of advanced waste treatment will be required at East Chicago, Gary, Hammond, and Michigan City as soon as practicable and at Crown Point, Hobart, and Valparaiso within the next 10 years.

I might say here that we think of advanced treatment not only in terms of removal of nutrients but also in removal of BOD and other constituents that are in the sewage.

East Chicago has completed preliminary pilot plant operation of advanced waste treatment methods and is embarking on the second phase of advanced waste treatment studies. Nutrient removal will be required as a part of advanced waste treatment. The smaller municipalities in the basin may also be required to provide an advanced degree of treatment to meet water quality criteria.

4. Installation of sewers and sewage treatment will be required within the next 10 years for most of the incorporated communities with public water supplies and no recognized sewer system. This includes Beverly Shores, Dune Acres, Long Beach, Michiana Shores, New Chicago, Ogden Dunes, Portage and the Town of Pines.

5. The municipalities of Hammond and Whiting will be required to provide treatment and disinfection of sewage and stormwater overflows from the Robertsdale, Atchison Avenue and Front Street outlets to Lake Michigan on or before the end of 1970. (In December 1967, Hammond authorized an engineering study of sewer separation in the Robertsdale area.) The Municipalities of East Chicago, Gary, Hammond, and Michigan City with storm and/or combined sewer overflows will be required to provide

disinfection and control of pollution from these overflows as soon as practicable.

The industries in the basin which have inadequate control or treatment facilities will have to provide them as shown in the following listing:

1. Completion of construction by the end of 1968.

a. E. I. du Pont de Nemours and Co., East Chicago

*b. Adolph Plating, Inc., East Chicago

*c. M & T Chemicals, Inc., East Chicago

*d. Industrial Tissue Div., Georgia-Pacific Corp., Gary

e. American Maize-Products Co.,Hammond

f. American Chemicals Co., Griffith

g. Phillips Drill Co., Michigan City

h. Gary Tube Works, U.S. Steel Corp., Gary

* On December 19, 1967, the Board issued a final order to the Adolph Plating, Inc., East Chicago, to abate pollution of the Grand Calumet River by the end of 1968. The order requires preliminary plans by March 1, 1968, and final plans

by June 1, 1968.

On December 19, 1967, the Board scheduled administrative hearings with the M & T Chemicals, Inc., for pollution of the Indiana Harbor Ship Canal and with the Industrial Tissue Division, Georgia-Pacific Corporation, Gary, for pollution of the Grand Calumet River. M & T Chemicals, Inc., obtained an agreement with the East Chicago Sanitary District for connection to the District's sewerage system and has agreed that the connection will be made by July 31, 1968, but in any event no later than December 31, 1968. The hearing with Georgia-Pacific Corporation was held on January 17, 1968. The hearing officer's findings and recommendations should be completed soon.

2. Cities Service Oil Company, Mobil Oil Company, Sinclair Refining Company, American Oil Company, and Union Carbide Chemicals Company will have to provide timetables for construction of additional waste treatment facilities to control BOD, oil, and threshold odor substances, which are consistent with the requirements of the Conference on Pollution of the Grand Calumet River, Little

Calumet River, Calumet River, Wolf Lake, Lake Michigan, and tributaries. The conclusions and recommendations of the Conferees established December 1968, as the latest date for completion of water pollution abatement facilities by industry except for a few industries where variation is justified and approved by the Board and Conferees.

3. The original timetable was June 30, 1970, for completion of all the necessary pollution abatement facilities by Inland Steel Company, Youngstown Sheet and Tube Company, and U. S. Steel Corporation's Gary Tube Works, Gary Steel Works, and Gary Sheet and Tin Mill. However, the schedule has been re-examined and new construction timetables established. In accepting the revised timetables, the Indiana Board took into consideration the complexity and magnitude of the job, the time required for site preparation prior to construction of some facilities, and the availability of skilled labor in the area. In view of these factors, the proposed schedules appear reasonable and the Board concluded the end objective, correction of pollution by the steel mills, would be accomplished. The new timetables and companies' estimates of the

percentage reduction of contaminants to meet established criteria are as follows:

Following is a listing of facilities proposed and under construction, and I will read the project and the old and new completion dates, both of which were submitted by the company.

United States Steel Corporation
Gary Tube Works, Gary, Indiana

1. Waste pickle liquor collection system. No discharge to receiving stream. This one is completed.

2. Solids clarification and oil skimming facilities. Both the old and the new are December 31, 1968.

United States Steel Corporation
Gary Steel Works, Gary, Indiana

1. Coke plant. Permanent connection of Coke Plant wastes into the Gary Sanitary District sewerage system and in-plant controls and waste separation. The old completion date was December 31, 1969; the new, December 31, 1968.

2. Blast furance area. Additional settling basins for flue dust, oil separators

in power station and waste segregation. The old, June 30, 1970; the new, December 1, 1969.

3. Steel making area. Construction of oil separators and segregation of waste water discharge to Blast Furnace Area, flue dust settling basins. The old date, June 30, 1970; the new, December 31, 1969.

4. Hot mills area, construction of sewers, sumps, pumps, piping, and settling and oil skimming basins. The old date, June 30, 1970; the new, December 31, 1969.

United States Steel Corporation
Gary Sheet and Tin Mill, Gary, Indiana

1. Six-stand Tandem Cold Reduction Mill facilities. Now completed.

2. Eighty-four-inch Hot Strip Mill filtration facility. Completed.

3. Deep well disposal system. No discharge to receiving stream. Completed.

4. Acid rinse waters from the existing sheet and tin mill, 66-inch continuous pickling line and the new 84-inch continuous pickling line will be diverted to the existing 6-stand tandem cold reduction

mill waste treatment plant. The old date, December 31, 1968; the new date, June 1, 1968.

5. Oily waste water from the 80-inch 5-stand cold reduction mill treatment plant will be diverted to the 6-stand tandem cold reduction mill waste treatment plant. The old date, June 30, 1968; the new, June 15, 1968.

6. Segregated wastewater from the tin mill will be discharged to the existing 6-stand tandem cold reduction mill waste treatment plant. The old date December 31, 1969; the new, June 30, 1969.

7. Segregated wastewater from sheet mill will be discharged to the expanded 6-stand tandem cold reduction mill waste treatment facilities. The old date March 30, 1970; the new date June 30, 1969.

8. Wastewater from the 80-inch hot strip mill scale pits will be diverted to the expanded 84-inch hot strip mill filtration plant. The old date was June 30, 1970. The new date is March 1, 1970.

In order to handle the additional waste loadings listed in items number 6 and number 7, additional primary solids and oil skimming, flocculation-clarification, and oil and solids handling facilities will be constructed at the 6-stand tandem cold reduction mill waste treatment facilities (the Terminal Treatment Plant). Additional filtration facilities will be added to the 84-inch Hot Strip Mill waste treatment plant to handle the waste load listed in item number 8. The expansion of both the Terminal Treatment Plant and the Hot Strip Mill will be completed by March 1, 1970.

Youngstown Sheet and Tube Company
East Chicago, Indiana

1. Coke Plant - Construction of napthalene scrubbers and connection of waste to the East Chicago Sanitary District. Completed.

2. No. 2 Open Hearth - Clarification facilities, cooling towers and water reuse system. No discharge to the receiving stream. Completed.

3. No. 3 Hot Strip Mill - Oil and

solids removal, chemical flocculation, scale pits, and filtration facilities. Both dates March 1, 1968.

4. Buttweld Mill - Pressure filters. The dates are December 31, 1968.

5. No. 1 Tin Mill - Sumps, pumps and sewers to collect oily wastes. Dates are December 31, 1968.

6. No. 1 Tin Mill, No. 2 Tin Mill and No. 2 Cold Reduced Sheet Mill - Central Water Treatment Plant for chemical treatment of oils and suspended solids, December 31, 1969, for both dates.

7. Hot Rolling Mills - Terminal lagoon for secondary clarification of effluent from lakefront scale pit. Dates are June 30, 1969.

8. No. 2 Cold Reduced Sheet Mill - Sumps, pumps and sewers to collect waste pickle liquor; and sumps, pumps, and sewers to collect oily waste. Both dates December 31, 1969.

9. Blast Furnace - Sewers, sumps and pumps to collect and recirculate all clarified waste from the Blast Furnace. No discharge

to receiving stream. Both dates June 30, 1970.

10. North Lagoon - A settling lagoon to collect treated wastes from the No. 5 Stand of the Tandem Rolling Mill, Sewer No. 23, and the No. 3 Hot Strip Mill. All effluent from the lagoon will be recirculated. No discharge to receiving stream. Completion, both dates June 30, 1970.

Inland Steel Company
East Chicago, Indiana

1. Permanent connection of Plant No. 2 and No. 3 Coke Plant ammonia still wastes and selected wastes to East Chicago Sanitary District sewerage system. Completed.

2. Additional settling basins and recirculation pumps will be installed at the Coke Quenching Stations in Plant No. 2 and No. 3 Coke Plants. Completion dates are November 1, 1968.

3. Plant No. 2 and No. 3 Blast Furnace Area in-plant controls and secondary flue dust settling basins. Both dates October 1, 1968.

4. Deep Well disposal system. No discharge to the receiving stream. The old date was June 30, 1968; the new date is March 1, 1968.

5. Twelve-inch Merchant Mill waste treatment plant. The old date was December 31, 1968; the new date is November 30, 1968.

I might indicate that this is entirely a new operating unit at the mill.

6. Terminal settling and oil skimming basin. The old date was May 1, 1970. The new date is May 1, 1970.

I might indicate here that Inland has bids out and four contractors are currently preparing bids on this facility and there will be a pre-bid meeting on February 6.

Inland Steel Company and U. S. Steel Corporation contended before the Board they would meet the criteria established by the Conferees by December 31, 1968, but could not meet the Indiana criteria until all the proposed facilities were completed. It is our judgment the total program is necessary to maintain the water quality criteria that have been adopted by both the Conferees and

Indiana.

The next table presents percentage compliance with requirements, and these tables were prepared and submitted by the companies and they show the completion of facilities to meet the water quality criteria. I will start with the December 31, 1967, information, and this shows for United States Steel Corporation that:

40 percent of the oil facilities will be complete;

Suspended Solids, 62 percent;

Phenol, zero;

Ammonia, zero;

Cyanide, zero;

Acidity, 100 percent;

Dissolved Iron, 100 percent.

For Youngstown Sheet and Tube Company:

Oil, 30 percent;

Suspended Solids, 20 percent;

Phenol, 100 percent;

Ammonia, 100 percent;

Cyanide, 100 percent;

Acidity, 100 percent;

Dissolved Iron, 100 percent.

Inland Steel Company:

Oil, 79 percent;

Suspended Solids, 33 percent;

Phenol, 84 percent;

Ammonia, 36 percent;

Acidity, zero;

Cyanide, 95 percent;

Dissolved Iron, zero.

I might say on the ones that have 100 percent with completion dates of December 31, 1967, that we have not yet made determinations of their effectiveness.

June 30, 1968, United States Steel Corporation:

Oil, 53 percent;

Suspended Solids, 71 percent;

Phenol, zero;

Ammonia, zero;

Cyanide, zero.

Youngstown Sheet and Tube Company:

Oil, 35 percent;

Suspended Solids, 25 percent.

Inland Steel Company:

Oil, 81 percent;

Suspended Solids, 33 percent;

Phenol, 84 percent;

Ammonia, 36 percent;

Acidity, 100 percent;

Cyanide, 95 percent;

Dissolved Iron, 100 percent.

December 31, 1968, United States Steel Corporation:

Oil, 65 percent;

Suspended Solids, 73 percent;

Phenol, 100 percent;

Ammonia, 100 percent;

Cyanide, 100 percent.

Youngstown Sheet and Tube Company:

Oil, 35 percent;

Suspended Solids, 45 percent.

The Inland Steel Company:

Oil, 90 percent;

Suspended Solids, 85 percent;

Phenol, 100 percent;

Ammonia, 100 percent;

Cyanide, 100 percent.

June 30, 1969. United States Steel Corporation:

Oil, 72 percent;

Suspended Solids, 74 percent.

Youngstown Sheet and Tube Company:

Oil, 55 percent;

Suspended Solids, 65 percent.

Inland Steel Company:

Oil, 90 percent;

Suspended Solids, 85 percent.

December 31, 1969, United States Steel Company:

Oil, 90 percent;

Suspended Solids, 98 percent.

Youngstown Sheet and Tube Company:

Oil, 100 percent;

Suspended Solids, 95 percent.

Inland Steel Company:

Oil, 90 percent;

Suspended Solids, 85 percent.

And for June 30, 1970, United States Steel Corporation:

Oil, 100 percent;

Suspended Solids, 100 percent.

Youngstown Sheet and Tube Company:

Suspended Solids, 100 percent.

Inland Steel Company:

Oil, 100 percent by May 1, 1970, and Suspended Solids, 100 percent, again by May 1, 1970.

St. Joseph River Basin - Indiana
Status of Pollution Abatement

All municipalities in the St. Joseph River Basin with a population above 3,000, except Elkhart, have secondary treatment. Mishawaka and several of the smaller municipalities now provide effluent chlorination. Elkhart has primary treatment and chlorination and has plans for secondary treatment. South Bend has completed plans for additions to its activated sludge plant and for effluent chlorination. Both of these cities filed applications for construction grants and would have proceeded to construction this year if sufficient construction grant funds had been available.

It is interesting to note here that in fiscal 1967 and 1968 Indiana had requests from 57 applicants for grant funds totaling $17,187,000-plus and only received allotment of $4,728,500. Indiana appropriated 3.65 million dollars for 25 percent matching grant funds in 1967 and 1968 and 4.95 million dollars for '68-69. We understand the budget request for the Federal budget is for $225 million. Unless the Federal Government fulfills its commitment by appropriating the authorized monies, the municipal construction program will not keep pace with the schedules and the plan of implementation. All sewered municipalities are to provide secondary treatment and chlorination by the end of 1972.

The eight industries in the St. Joseph River Basin with inadequate treatment facilities will be required to provide adequate treatment by the end of 1969.

Pollution

The sources of pollution in the St. Joseph River Basin are municipal sewage, combined sewer overflows, and industrial wastes.

All but four sewered municipalities (less than 2 percent of the sewered population) in the St. Joseph River Basin provide sewage treatment facilities. Of the 13 municipalities providing sewage treatment, 11 have secondary treatment. The Cities of Elkhart and Ligonier need to expand primary treatment facilities by adding secondary treatment. Mishawaka and South Bend need plant expansion and effluent chlorination is needed at South Bend.

The Indiana Stream Pollution Control Board in 1964 mandated that South Bend provide effluent chlorination and an engineering study of sewage works improvement needs. However, the city has appealed the Board's order and this litigation is now pending in the Starke Circuit Court. Plans for chlorination facilities for South Bend have been approved. Plans for sewage works expansion have been submitted by South Bend, Elkhart, and Ligonier.

While the present concentrations of phosphate in the St. Joseph River are not considered significant due to the adequacy of dilution water, it may be necessary in the future for South Bend, Mishawaka, and Elkhart to provide phosphate removal as part of their treatment. Because of conditions in lakes below Angloa and Kendallville, it will be necessary for these municipalities to provide nutrient removal.

I might say that this report was prepared in 1966 and we are now willing to agree that nutrient removal is needed at these plants to protect Lake Michigan.

There are 22 industries in the St. Joseph River Basin which handle a significant volume of waste. Seven of these industries provide treatment facilities with soil absorption of the effluent and, therefore, have no outlet to a receiving stream. The remaining 15 industries discharge treated effluents directly into streams of the basin, and of these there are eight that do not have adequate treatment. The appendix shows the type and status of treatment facilities. The industries listed as inadequate have been advised by the Board to abate pollution.

Another pollution problem of the basin is the bacteriological pollution of the St. Joseph River caused by treated municipal sewage and combined sewer overflows from South Bend, Mishawaka, and Elkhart. There are some locations in the river with slightly depressed bottom fauna due to sludge deposits.

Summary of Water Uses

1. All waters in the basin will be required to support a well-balanced, warn-water fish population and must be suitable for agricultural uses.

2. All waters, where natural temperatures permit, will be required to support put-and-take trout fishing.

3. All reservoirs and lakes in the basin and the St. Joseph River must be maintained for whole body contact recreation and all other streams for partial body contact recreation, such as boating, canoeing, and fishing.

4. All waters which are used for public or industrial water supply must meet said criteria, and where needed for this purpose in the future will meet the criteria.

Implementation and Enforcement Plan

The Board adopted SPC 1R as the standard of water quality for the waters of the St. Joseph

River Basin. All waters, based on the use concept, will be required to meet the standards, for the appropriate public and industrial water supply, aquatic life, recreational, and agricultural uses mentioned previously. Compliance with these standards will enhance the quality of waters within this basin. In existing high quality waters every effort will be made to maintain high quality consistent with the powers granted under the Indiana Act.

The Board will require construction of municipal treatment facilities in accordance with the following timetable:

1. Secondary treatment facilities are to be provided by the City of Elkhart by the end of 1969 and by the City of Ligonier by the end of 1972. Said facilities are to include effluent chlorination. Both cities have submitted plans for plant additions.

2. Expansion of secondary treatment facilities will be required by South Bend and Mishawaka

by the end of 1972. South Bend has submitted plans for plant expansion.

3. South Bend is to provide effluent chlorination facilities as soon as practicable. Ashley, Goshen, and LaGrange are to provide effluent chlorination by the end of 1972.

4. Treatment facilities, including effluent chlorination, are to be provided by Cromwell, Milford Junction, Topeka, and Wakarusa on or before the end of 1972.

5. Installation of advanced waste treatment or provision for low flow augmentation will be required at Angola within the next 10 years. Phosphate removal will be required at Angola and Kendallville as soon as practicable methods are developed.

The eight industries in the basin with inadequate treatment facilities will be required to provide adequate treatment for indicated contaminants by the following time schedule:

The end of 1968, Weatherhead Corporation, Angola.

The end of 1969, Bristol Band Instrument Company, Bristol;

Continental Can Company, Elkhart;

New York Central System, Elkhart;

Penn Electric Switch Company, Goshen;

Middlebury Cooperative Creamery, Inc., Middlebury;

New Paris Creamery Company, New Paris;

Gentner Packing Company, South Bend.

I might say here that the Federal Report also has eight industries, but the last five differ between those in their report and the ones in our report:

The Elkhart Packing Company has no discharge, according to inspections made in 1967;

McCray Refrigerator Company, Kendallville, and Bendix Corporation, South Bend, both discharge their wastes to municipal sewer systems.

The Price Duck Farms at Milford, starting in 1966 raised ducks on channels with no discharge to the stream, and the Slabaugh Duck Farms at Milford no longer raises ducks and this is shown by inspections in 1966 and 1967.

Summary

1. Completion of the programs outlined herein will greatly enhance the water quality of the extreme south end of Lake Michigan and the St. Joseph River Basin. However, some sources of pollution, i.e., nutrients, oil, wastes from water-craft, dredged materials, and dead alewives, require additional study and a general agreement by all concerned on programs to provide the necessary control.

2. Mandatory certification of plant operators, both municipal and industrial, will improve the efficiency of treatment plants and reduce accidental discharges.

Here I would like to add that the General Assembly in 1967 enacted a law requiring mandatory certification of both municipal and industrial treatment works.

3. Additional studies are needed to develop plant scale projects to effect phosphate and other nutrient removals. Significant sources of nutrients, aside from that measured in sewage treatment plant effluent, need to be determined and methods developed for effective control. Nutrient removal will be required of major sources as soon as practicable methods are developed.

4. The discharge of oil from lake-going vessels and miscellaneous sources must be abated. Strengthened Federal legislation on oil pollution will be helpful. However, there will always be accidents or "Acts of God" which will require more effective surveillance, the development of a warning system, and the development of practicable control procedures

which can be put into effect quickly.

5. Pollution caused by the discharge of wastes from watercraft, including untreated sewage, ballast and bilge water, litter and garbage, and oil, requires additional attention. The Indiana Boating Law prohibits the discharge of human waste from boats on all Indiana waters except Lake Michigan. It will be recommended to the 1969 General Assembly that the law be amended to include Lake Michigan waters.

6. The States should support Federal legislation to regulate pollution by commercial vessels engaged in interstate commerce and each State should provide for uniform regulation of pollution by recreational watercraft.

7. The pollution caused by dumping of dredged materials in Lake Michigan must be controlled. On August 16, 1966, the Indiana Stream Pollution Control Board adopted a

policy opposing the dumping in Lake Michigan of dredged material which contains substances that are polluting in character, whether they be of organic material or of petroleum sources. It is recognized dredging of harbors must continue in order to maintain navigation. There should be close cooperation by the States and other affected agencies with the Corps of Engineers in its pilot program. It is recommended that a timetable for the discontinuance of disposal in the lake of dredged materials which are polluting in character be adopted which is similar to the timetables established for municipalities and industries.

8. The alewife problem requires immediate attention to effect satisfactory disposal of dead alewives that are anticipated in the summer of 1968. Measures must be developed and put in operation to abate the alewife population

explosion. As this problem is pertinent to all the Great Lakes, effective control measures should be initiated by appropriate Federal agencies with the cooperation of State agencies.

9. In addition to the current problems in Lake Michigan, many future problems of pollution can be avoided or minimized through a program of coordinated and comprehensive planning for the development of the water resources of the Great Lakes Basin. The newly-created Great Lakes Basin Commission, of which all the Great Lakes States and involved departments of the Federal Government are members, appears to be the proper vehicle for such coordination.

Thank you.

MR. STEIN: Thank you very much, Mr. Miller.

(Applause.)

(Which said report, with attached tables and maps, is as follows:)

PERRY MILLER

FOR CONFERENCE
ON
LAKE MICHIGAN

CALLED BY
SECRETARY STEWART L. UDALL
DEPARTMENT OF THE INTERIOR

STARTING JANUARY 31, 1968
CHICAGO, ILLINOIS

ON BEHALF OF THE
INDIANA STREAM POLLUTION CONTROL BOARD
AND
THE STATE OF INDIANA

JANUARY 1968

1966

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PERRY MILLER

Introduction

In accordance with the requirements of the Federal Water Quality Act of 1965, Indiana undertook the adoption of updated water quality standards in 1966. Pursuant to the provisions of Chapter 120, Acts of 1945, public hearings were held on proposed standards in river basins throughout the State. The proposed standards and plans for implementation, which included proposed timetables, were mailed to municipalities, industries, adjacent States, the Federal Water Pollution Control Administration, and others prior to the hearings. At the public hearing for the Lake Michigan Basin, the Illinois Sanitary Water Board endorsed the proposed criteria as consistent with those adopted by Illinois. The proposed timetables were not questioned by Illinois or the Federal Water Pollution Control Administration. At the public hearing for the St. Joseph River Basin, the State of Michigan agreed with proposed criteria but offered the comment that the MPN/100 ml coliform index would be unrealistic during periods of stormwater runoff. Following the hearings, Regulations SPC 1R, SPC 4, SPC 5, SPC 6, SPC 7, SPC 8, SPC 9, and SPC 10 and implementation plans for the respective basins were adopted by the Stream Pollution Control Board as Indiana's new water quality standards and submitted to the Department of the Interior for consideration of approval. Secretary Udall notified Governor Branigin on July 18, 1967, that he had approved the Indiana Water Quality Standards.

The implementation plans for the respective basins provide background information, cite specific pollution sources, enumerate water uses and provide a timetable for municipalities and industries to complete construction of necessary facilities.

The following report includes the status of municipal and industrial waste pollution abatement and control measures in the Lake Michigan drainage area of Lake, Porter, and LaPorte Counties and in the St. Joseph River Basin. Much of the material is excerpted from the Indiana plan submitted to the Department of the Interior. Where necessary it has been updated.

PERRY MILLER

Description of Basin

Geography

The Lake Michigan drainage basin is located in the northwestern corner of the State and covers an area of 615 square miles including portions of Lake, Porter, LaPorte, and St. Joseph Counties. The basin averages 15 miles in width and curves around the southern tip of Lake Michigan for a distance of about 50 miles; and it is bounded on the north by the State of Michigan; on the south by the Kankakee River Basin; and on the west by the State of Illinois.

Population

The northern portions of Lake and Porter Counties have experienced a tremendous rate of growth since the turn of the century. Lake County alone has, during this period, shown an increase of 1,250 percent. The plentiful supply of water available from Lake Michigan; industrial development; excellent highways; railroads; waterway transportation arteries; and the Chicago urban area are a few factors stimulating this phenomenal growth. It should be noted that 84 percent of the Lake

County population is located in the upper third of the county along the shores of Lake Michigan and the major watercourses of the basin. The estimated 1960 population of the Lake Michigan Basin in Indiana was 620,588.

Water Quality

At present, the Stream Pollution Control Board and the Indiana State Board of Health operate 15 water quality monitoring stations in the basin. There are four located on Burns Ditch near Portage; four on the Grand Calumet River (one at Hammond, two at East Chicago and one at Gary); three on the Indiana Harbor Canal in East Chicago; two on Lake Michigan (one each at the Michigan City and Whiting water supply intakes); one on the Little Calumet River in Hammond; and one at Wolf Lake at the culvert at the state line.

Pollution

The principal sources of pollution in the basin in Idnaian are industrial wastes, municipal sewage, ıd combined sewer overflows. Other wastes discharged intermittently may have serious local effects or may cause temporary excessive pollution. Among these wastes are accidental spills from storage tanks and barges; wastes from lake vessels, barge tows and pleasure craft; and materials from dredging operations.

All sewered municipalities have some combined sewers which contribute to pollution during periods of storm. Combined sewer overflows contribute gross bacterial pollution, high suspended solids concentrations, and heavy BOD loadings. Industrial waste present in such systems contribute to the pollution problem. Phosphates and other nutrients contribute to algae growth in receiving waters.

The water quality in the Open Water of Lake Michigan is excellent with the exception of periods of high threshold odors and increased concentrations of ammonia-nitrogen caused by industrial wastes.

Shore water east of the Inner Harbor Basin is of good quality and generally satisfactory for whole body contact recreation. However, shore water within the Inner Harbor Basin is of poor quality which is attributed to combined sewer overflows and wastes discharges in this basin. The Front Street combined sewer overflow at

Whiting at times discharges untreated sewage directly to Lake Michigan, and the Atchison Avenue stormwater pumping station in Whiting and the Robertsdale stormwater pumping station in Hammond discharge stormwater overflow from combined sewers to Lake Michigan. In addition, stormwater overflows from East Chicago and Gary to the Grand Calumet River and the Indiana Harbor Canal contribute to the poor water quality. Reduction of combined sewer overflows or control facilities including disinfection of storm overflows will be necessary.

The Inner Harbor Basin water quality is generally satisfactory. However, there are intermittent periods of high threshold odor, ammonia-nitrogen, phenols, and coliform bacteria. This pollution is the result of direct discharges to the lake from sewers and the flow from the Indiana Harbor Canal.

Waters of the Indiana Harbor Canal and the Grand Calumet River are unsightly and characterized by floating debris, oil, discoloration, and high suspended solids loading. These waters are industrial process and cooling water, treated and chlorinated effluents from the Gary and East Chicago Sanitary Districts treatment plants and combined sewer overflows. The 26 industries with direct discharges to the Grand Calumet River, Indiana Harbor Canal or Lake Michigan waters and the status of their waste treatment or control facilities are shown in the appendix. Further treatment of industrial wastes is necessary to enhance the water quality and to meet the standards for the Grand Calumet River, Indiana Harbor Canal and Lake Michigan waters.

Water quality is generally good in the Little Calumet River-Burns Ditch-Lake Michigan drainage area. Provision of sewage treatment plants, disinfection of effluents, treatment of all industrial wastes, and improved soil conservation measures to reduce pollution from agricultural runoff are needed to meet the water quality criteria. Water quality in Trail Creek is generally poor due to high bacterial counts resulting from combined sewer overflows during periods of storm and from the bypassing of raw sewage at the Michigan City sewage treatment plant. Michigan City will complete construction in 1968 of a project to provide additions, including effluent chlorination, to its activated sludge plant for a design capacity of 15 mgd.

Summary of Water Uses

1. Lake Michigan open water and Inner Harbor Basin water will be required to be suitable for public and industrial water supply, maintenance of a well-balanced, warm-water fish population, water-oriented recreation and will also be required to meet the standards as set forth in Regulations SPC 4 and SPC 6, respectively.
2. Lake Michigan shore water, including the three existing bathing beaches located in the Inner Harbor area, and Wolf Lake will be required to be suitable for maintenance of a well-balanced, warm-water fish population, whole body contact recreational activities and will also be required to meet the standards set forth in Regulations SPC 5 and SPC 10, respectively.

3. The Grand Calumet River and Indiana Harbor Canal serve as sources of industrial water supplies and must meet the standards set forth in Regulations SPC 8 and SPC 7, respectively.
4. The Little Calumet River-Burns Ditch and tributaries and other streams flowing to Lake Michigan will be required to support a well-balanced, warm-water fish population, be suitable for partial body contact recreation, and agricultural uses, and meet the standards as set forth in Regulation SPC 1R.

Implementation and Enforcement Plan

The Board will require construction of municipal treatment facilities in accordance with the following timetable:

1. The Town of Porter is to provide treatment facilities as soon as practicable in compliance with the outstanding Stream Pollution Control Board order. The Attorney General has filed for enforcement

action in the Porter County Circuit Court. Plans are underway for treatment of sewage from Porter at the Chesterton sewage treatment plant.

2. Expansion of treatment facilities will be required by Hammond and by Valparaiso on or before the end of 1972.

3. Installation of advanced waste treatment will be required at East Chicago, Gary, Hammond, and Michigan City as soon as practicable and at Crown Point, Hobart, and Valparaiso within the next 10 years. East Chicago has completed preliminary pilot plant operation of advanced waste treatment methods and is embarking on the second phase of advanced waste treatment studies. Nutrient removal will be required as a part of advanced waste treatment. The smaller municipalities in the basin may also be required to provide an advanced degree of treatment to meet water quality criteria.

4. Installation of sewers and sewage treatment will be required within the next 10 years for most of the incorporated communities with public water supplies and no recognized sewer system. This includes Beverly Shores, Dune Acres, Long Beach, Michiana Shores, New Chicago, Ogden Dunes, Portage, and the Town of Pines.

5. The municipalities of Hammond and Whiting will be required to provide treatment and disinfection of sewage and stormwater overflows from the Robertsdale, Atchison Avenue and Front Street outlets to Lake Michigan on or before the end of 1970. (In December 1967, Hammond authorized an engineering study of sewer separation in the Robertsdale area.) The municipalities of East Chicago, Gary, Hammond, and Michigan City with storm and/or combined sewer overflows will be required to provide disinfection

and control of pollution from these overflows as soon as practicable.

The industries in the basin which have inadequate control or treatment facilities will have to provide them as shown in the following listing:

1. Completion of construction by the end of 1968.
   - a. E. I. du Pont de Nemours and Company, Inc., East Chicago
   - *b. Adolph Plating, Inc., East Chicago
   - *c. M & T Chemicals, Inc.,East Chicago
   - *d. Industrial Tissue Division, Georgia-Pacific Corporation, Gary
   - e. American Maize-Products Company, Hammond
   - f. American Chemicals Company, Griffith
   - g. Phillips Drill Company, Michigan City
   - h. Gary Tube Works, U.S. Steel Corporation, Gary

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* On December 19, 1967, the Board issued a final order to the Adolph Plating, Inc., East Chicago, to abate pollution of the Grand Calumet River by the end of 1968. The order requires preliminary plans by

March 1, 1968, and final plans by June 1, 1968.

On December 19, 1967, the Board scheduled administrative hearings with the M & T Chemicals, Inc., for pollution of the Indiana Harbor Ship Canal and with the Industrial Tissue Division, Georgia-Pacific Corporation, Gary, for pollution of the Grand Calumet River. M & T Chemicals, Inc., obtained an agreement with the East Chicago Sanitary District for connection to the District's sewerage system and has agreed that the connection will be made by July 31, 1968, but in any event no later than December 31, 1968. The hearing with Georgia-Pacific Corporation was held on January 17, 1968. The hearing officer's findings and recommendations should be completed soon.

2. Cities Service Oil Company, Mobil Oil Company, Sinclair Refining Company, American Oil Company, and Union Carbide Chemicals Company will have to provide timetables for construction of additional waste treatment facilities to control BOD, oil, and threshold odor subatances, which are consistent

with the requirements of the Conference on Pollution of the Grand Calumet River, Little Calumet River, Calumet River, Wolf Lake, Lake Michigan, and tributaries. The conclusions and recommendations of the Conferees established December 1968, as the latest date for completion of water pollution abatement facilities by industry except for a few industries where variation is justified and approved by the Board and Conferees.

3. The original timetable was June 30, 1970, for completion of all the necessary pollution abatement facilities by Inland Steel Company, Youngstown Sheet and Tube Company, and U. S. Steel Corporation's Gary Tube Works, Gary Steel Works, and Gary Sheet and Tin Mill. However, the schedule has been reexamined and new construction timetables established.

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The new timetables and companies' estimates of the percentage reduction of contaminants to meet established criteria are as follows:

FACILITIES PROPOSED AND UNDER CONSTRUCTION

Project	Contaminants to be Removed	Old Completion Date	New Completion Date
United States Steel Corporation Gary Tube Works, Gary, Indiana			
1. Waste pickle liquor collection system. No discharge to receiving stream.	Acid and iron	12/31/67	Completed
2. Solids clarification and oil skimming facilities.	Oil and suspended solids	12/31/68	12/31/68
United States Steel Corporation Gary Steel Works, Gary, Indiana			
1. Coke Plant - Permanent connection of Coke Plant wastes into the Gary Sanitary District sewerage system and in-plant controls and waste separation.	Ammonia, cyanide, phenols, oils, BOD, and suspended solids	12/31/69	12/31/68
2. Blast Furnace Area - Additional settling basins for flue dust, oil separators in power station and waste segregation.	Oils and suspended solids	6/30/70	12/1/69
3. Steel Making Area - Construction of oil separators and segregation of wastewater with discharge to Blast Furnace Area flue dust settling basins.	Oil and suspended solids	6/30/70	12/31/69
4. Hot Mills Area - Construction of sewers, sumps, pumps, piping, and settling and oil skimming basins.	Oil and suspended solids	6/30/70	12/31/69
United States Steel Corporation Gary Sheet and Tin Mill, Gary, Indiana			
1. 6-Stand Tandem Cold Reduction Mill facilities.	Suspended solids, free oils, emulsified oils, BOD, and iron	--	Completed

FACILITIES PROPOSED AND UNDER CONSTRUCTION (continued)

	Project	Contaminants to be Removed	Old Completion Date	New Completion Date
2.	84-inch Hot Strip Mill filtration facility.	Suspended solids, oils, and iron	--	Completed
3.	Deep Well disposal system. No discharge to receiving stream.	Acidity and iron	--	Completed
4.	Acid rinse waters from the existing Sheet and Tin Mill 66-inch Continuous Pickling Line and the New 84-inch Continuous Pickling Line will be diverted to the existing 6-Stand Tandem Cold Reduction Mill waste treatment plant.	Iron, acidity, and suspended solids	12/31/68	6/ 1/68
5.	Oily wastewater from the 80-inch 5-Stand Cold Reduction Mill treatment plant will be diverted to the 6-Stand Tandem Cold Reduction Mill waste treatment plant.	Suspended solids, free oils, emulsified oils, and iron	6/30/68	6/15/68
*6.	Segregated wastewater from Tin Mill will be discharged to the existing 6-Stand Tandem Cold Reduction Mill waste treatment plant.	Iron, suspended solids, free oils, emulsified oils, and BOD	12/31/69	6/30/69
*7.	Segregated wastewater from Sheet Mill will be discharged to the expanded 6-Stand Tandem Cold Reduction Mill waste treatment facilities.	Iron, suspended solids, free oils, emulsified oils, and BOD	3/30/70	6/30/69
*8.	Wastewater from the 80-inch Hot Strip Mill scale pits will be diverted to the expanded 84-inch Hot Strip Mill Filtration Plant.	Iron, suspended solids, and oils	6/30/70	3/ 1/70

* In order to handle the additional waste loadings listed in Items No. 6 and No. 7, additional primary solids and oil skimming, flocculation-clarification, and oil and solids handling facilities will be constructed at the 6-Stand Tandem Cold Reduction Mill waste treatment facilities (Terminal Treatment Plant). Additional filtration facilities will be added to the 84-inch Hot Strip Mill waste treatment plant to handle the waste load listed in Item No. 8. The expansion of both the Terminal Treatment Plant and the Hot Strip Mill will be completed by March 1, 1970.

FACILITIES PROPOSED AND UNDER CONSTRUCTION (continued)

Youngstown Sheet and Tube Company
East Chicago, Indiana

	Project	Contaminants to be Removed	Old Completion Date	New Completion Date
1.	Coke Plant - Construction of napthalene scrubbers and connection of waste to the East Chicago Sanitary District.	Ammonia, cyanide, phenols, oils, BOD, and suspended solids	--	Completed
2.	No. 2 Open Hearth - Clarification facilities, cooling towers and water reuse system. No discharge to receiving stream.	Oil and suspended solids	12/31/67	Completed
3.	No. 3 Hot Strip Mill - Oil and solids removal, chemical flocculation, scale pits, and filtration facilities.	Free oil, emulsified oil, suspended solids, and iron	3/1/68	3/1/68
4.	Buttweld Mill - Pressure filters	Oil and suspended solids	12/31/68	12/31/68
5.	No. 1 Tin Mill - Sumps, pumps, and sewers to collect oily waste.	Oils	12/31/68	12/31/68
6.	No. 1 Tin Mill, No. 2 Tin Mill and No. 2 Cold Reduced Sheet Mill - Central Water Treatment Plant for chemical treatment of oils and suspended solids.	Oils and suspended solids	12/31/69	12/31/69
7.	Hot Rolling Mills - Terminal lagoon for secondary clarification of effluent from lake front scale pit.	Oils and suspended solids	6/30/69	6/30/69
8.	No. 2 Cold Reduced Sheet Mill - Sumps, pumps, and sewers to collect waste pickle liquor; and sumps, pumps, and sewers to collect oily waste.	Acidity, suspended solids, oils and iron	12/31/69	12/31/69

FACILITIES PROPOSED AND UNDER CONSTRUCTION (continued)

Project	Contaminants to be Removed	Old Completion Date	New Completion Date
9. **Blast Furnace** - Sewers, sumps, and pumps to collect and recirculate all clarified waste from the Blast Furnace. No discharge to receiving stream.	Cyanide, oils, and suspended solids	6/30/70	6/30/70
10. **North Lagoon** - A settling lagoon to collect treated wastes from the No. 5 Stand of the Tandem Rolling Mill, Sewer No. 23, and the No. 3 Hot Strip Mill. All effluent from the lagoon will be recirculated. No discharge to receiving stream.	Oils and suspended solids	6/30/70	6/30/70

Inland Steel Company
East Chicago, Indiana

Project	Contaminants to be Removed	Old Completion Date	New Completion Date
1. Permanent connection of Plant No. 2 and No. 3 Coke Plant ammonia still wastes and selected wastes to the East Chicago Sanitary District sewerage system (temporary facility in operation at present time).	Ammonia, cyanide, phenols, oils, BOD, and suspended solids	10/1/67	Completed
2. Additional settling basins and recirculation pumps will be installed at the Coke Quenching Stations in Plant No. 2 and No. 3 Coke Plants.	Ammonia, cyanide, phenols, oils, and suspended solids	11/1/68	11/1/68
3. Plant No. 2 and No. 3 Blast Furnace Area in-plant controls and secondary flue dust settling basins.	Oils and suspended solids	10/1/68	10/1/68
4. Deep Well disposal system. No discharge to receiving stream.	Acidity, suspended solids, and iron	6/30/68	3/1/68

FACILITIES PROPOSED AND UNDER CONSTRUCTION (continued)

	Project	Contaminants to be Removed	Old Completion Date	New Completion Date
5.	12-inch Merchant Mill waste treatment plant.	Oils and suspended solids	12/31/68	11/30/68 (new operation)
6.	Terminal settling and oil skimming basin.	Oils, suspended solids, and iron	5/1 /70	5/ 1/70

PERCENT COMPLIANCE WITH REQUIREMENTS
DATA SUBMITTED BY THE COMPANIES

Contaminant	6-30 1967	12-31 1967	6-30 1968	12-31 1968	6-30 1969	12-31 1969	6-30 1970
United States Steel Corporation							
Oil	28%	40%	53%	65%	72%	90%	100%
Suspended Solids	30%	62%	71%	73%	74%	98%	100%
Phenol	0%	0%	0%	100%	--	--	--
Ammonia	0%	0%	0%	100%	--	--	--
Cyanide	0%	0%	0%	100%	--	--	--
Acidity	0%	100%	--	--	--	--	--
Dissolved Iron	0%	100%	--	--	--	--	--
Youngstown Sheet and Tube Company							
Oil	25%	30%	35%	35%	55%	100%	--
Suspended Solids	20%	20%	25%	45%	65%	95%	100%
Phenol	0%	100%	--	--	--	--	--
Ammonia	0%	100%	--	--	--	--	--
Cyanide	0%	100%	--	--	--	--	--
Acidity	0%	100%	--	--	--	--	--
Dissolved Iron	0%	100%	--	--	--	--	--
Inland Steel Company							
Oil	--	79%	81%	90%	90%	90%	100%
Suspended Solids	--	33%	33%	85%	85%	85%	100%
Phenol	--	84%	84%	100%	--	--	--
Ammonia	--	36%	36%	100%	--	--	--
Acidity	--	0%	100%	--	--	--	--
Cyanide	--	95%	95%	100%	--	--	--
Dissolved Iron	--	0%	100%	--	--	--	--

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St. Joseph River Basin - Indiana
Status of Pollution Abatement

All municipalities in the St. Joseph River Basin with a population above 3,000, except Elkhart, have secondary treatment. Mishawaka and several of the smaller municipalities now provide effluent chlorination. Elkhart has primary treatment and chlorination and has plans for secondary treatment. South Bend has completed plans for additions to its activated sludge plant and for effluent chlorination. Both of these cities filed applications for construction grants and would have proceeded to construction this year if sufficient construction grant funds had been available. All sewered municipalities are to provide secondary treatment and chlorination by the end of 1972.

The eight industries in the St. Joseph River Basin with inadequate treatment facilities will be required to provide adequate treatment by the end of 1969.

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Description of Basin

Geography

The drainage area of the St. Joseph River and tributaries in Indiana is approximately 1,670 square miles and includes all or parts of St. Joseph, Elkhart, LaGrange, Steuben, Kosciusko, Noble, and DeKalb Counties. The headwaters of the St. Joseph River are in southern Michigan. The river flows southwesterly into Indiana through the northern parts of Elkhart and St. Joseph Counties, and thence northwesterly back through Michigan where it discharges into Lake Michigan about 50 river miles north of the Indiana State line.

Population

The estimated 1960 population of the St. Joseph River Basin in Indiana is approximately 373,500. The largest city in the basin is South Bend with a population in 1960 of 132,445. The population of South Bend will probably reach 160,000 by 1980 and exceed 230,000 by 2020. The total urban population of the basin in Indiana is expected to be approximately 300,000 in 1980 and

440,000 in 2020.

Water Quality

There are two water quality monitoring stations on the Indiana section of the St. Joseph River. One station is about 1.5 miles upstream from Elkhart at a county road bridge. The other station is located at the Auten Road Bridge about 1.3 miles downstream from the South Bend sewage treatment plant outfall. Data have been collected at these stations since 1957 as a part of the State's Water Quality Monitoring Program.

The water quality data show the St. Joseph River is generally good. The dissolved oxygen concentrations and biochemical oxygen demand values are satisfactory. High coliform values are noted in the St. Joseph River in the South Bend, Mishawaka, and Elkhart area. However, other than nutrients, it is not considered that the Indiana contribution to the St. Joseph River has any adverse effect on Lake Michigan.

Pollution

The sources of pollution in the St. Joseph River Basin are municipal sewage, combined sewer overflows, and industrial wastes.

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All but four sewered municipalities (less than 2 percent of the sewered population) in the St. Joseph River Basin provide sewage treatment facilities. Of the 13 municipalities providing sewage treatment, 11 have secondary treatment. The Cities of Elkhart and Ligonier need to expand primary treatment facilities by adding secondary treatment. Mishawaka and South Bend need plant expansion and effluent chlorination is needed at South Bend.

The Indiana Stream Pollution Control Board in 1964 mandated that South Bend provide effluent chlorination and an engineering study of sewage works improvement needs. However, the City has appealed the Board's order and this litigation is now pending in the Starke Circuit Court. Plans for chlorination facilities for South Bend have been approved. Plans for sewage works expansion have been submitted by South Bend, Elkhart, and Ligonier.

While the present concentrations of phosphate in the St. Joseph River are not considered significant due to the adequacy of dilution water, it may be necessary in the future for South Bend, Mishawaka, and Elkhart to provide phosphate removal as part of their treatment. Because of conditions in lakes below Angloa and Kendallville, it will be necessary for these municipalities to provide nutrient removal.

There are 22 industries in the St. Joseph River Basin which handle a significant volume of waste. Seven of these industries provide treatment facilities with soil absorption of the effluent and, therefore, have no outlet to a receiving stream. The remaining 15 industries discharge treated effluents directly into streams of the basin, and of these there are eight that do not have adequate treatment. The appendix shows the type and status of treatment facilities. The industries listed as inadequate have been advised by the Board to abate pollution.

Another pollution problem of the basin in the bacteriological pollution of the St. Joseph River caused by treated municipal sewage and combined sewer overflows from South Bend, Mishawaka, and Elkhart. There are some locations in the river with slightly depressed bottom fauna due to sludge deposits.

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Summary of Water Uses

1. All waters in the basin will be required to support a well-balanced, warm-water fish population and must be suitable for agricultural uses.
2. All waters, where natural temperatures permit, will be required to support put-and-take trout fishing.
3. All reservoirs and lakes in the basin and the St. Joseph River must be maintained for whole body contact recreation and all other streams for partial body contact recreation, such as boating, canoeing and fishing.
4. All waters which are used for public or industrial water supply must meet said criteria, and where needed for this purpose in the future will meet the criteria.

Implementation and Enforcement Plan

The Board adopted SPC 1R as the standard of water quality for the waters of the St. Joseph River Basin. All waters, based on the use concept, will be required to meet the standards, for the appropriate public and industrial water supply, aquatic life, recreational, and agricultural uses mentioned previously. Compliance with these standards will enhance the quality of waters within this basin. In existing high quality waters every effort will be made to maintain high quality consistent with the powers granted under the Indiana Act.

The Board will require construction of municipal treatment facilities in accordance with the following timetable:

1. Secondary treatment facilities are to be provided by the City of Elkhart by the end of 1969 and by the City of Ligonier by the end of 1972. Said facilities are to include effluent chlorination. Both cities have submitted plans for plant additions.
2. Expansion of secondary treatment facilities will be required by South Bend and Mishawaka by the end of 1972. South Bend has submitted plans for plant expansion.

3. South Bend is to provide effluent chlorniation facilities as soon as practicable. Ashley, Goshen, and LaGrange are to provide effluent chlorination by the end of 1972.

4. Treatment facilities, including effluent chlorination, are to be provided by Cromwell, Milford Junction, Topeka, and Wakarusa on or before the end of 1972.

5. Installation of advanced waste treatment or provision for low flow augmentation will be required at Angola within the next 10 years. Phosphate removal will be required at Angola and Kendallville as soon as practicable methods are developed.

6. Installation of sewers and sewage treatment facilities will be required within the next 10 years for incorporated communities with public water supplies and no recognized sewer system. This includes Middlebury, Millersburg, and Wolcottville.

The eight industries in the basin with inadequate treatment facilities will be required to provide adequate treatment for indicated contaminants by the following time schedule:

End of 1968

Industry	Contaminants
Weatherhead Corporation, Angola	Oil, cyanide, and heavy metals

End of 1969

Industry	Contaminants
Bristol Band Instrument Co., Bristol	Cyanide and heavy metals
Continental Can Co., Elkhart	BOD, suspended solids, and color
New York Central System, Elkhart	Oils, BOD, and suspended solids
Penn Electric Switch Co., Goshen	Oil, cyanide, and heavy metals
Middlebury Co-operative Creamery, Inc., Middlebury	BOD and suspended solids
New Paris Creamery Co., New Paris	BOD and suspended solids
Gentner Packing Co., South Bend	BOD and suspended solids

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Summary

1. Completion of the programs outlined herein will greatly enhance the water quality of the extreme south end of Lake Michigan and the St. Joseph River Basin. However, some sources of pollution, i.e., nutrients, oil, wastes from watercraft, dredged materials, and dead alewives, require additional study and a general agreement by all concerned on programs to provide the necessary control.
2. Mandatory certification of plant operators both municipal and industrial will improve the efficiency of treatment plants and reduce accidental discharges.
3. Additional studies are needed to develop plant scale projects to effect phosphate and other nutrient removals. Significant sources of nutrients, aside from that measured in sewage treatment plant effluent,

need to be determined and methods developed for effective control. Nutrient removal will be required of major sources as soon as practicable methods are developed.

4. The discharge of oil from lake-going vessels and miscellaneous sources must be abated. Strengthened Federal legislation on oil pollution will be helpful. However, there will always be accidents or "Acts of God" which will require more effective surveillance, the development of a warning system, and the development of practicable control procedures which can be put into effect quickly.

5. Pollution caused by the discharge of wastes from watercraft, including untreated sewage, ballast and bilge water, litter and garbage, and oil, requires additional attention. The Indiana Boating Law prohibits the discharge of human waste from boats on all Indiana waters except Lake

Michigan. It will be recommended to the 1969 General Assembly that the law be amended to include Lake Michigan waters.

6. The States should support Federal legislation to regulate pollution by commercial vessels engaged in interstate commerce and each State should provide for uniform regulation of pollution by recreational watercraft.

7. The pollution caused by dumping of dredged materials in Lake Michigan must be controlled. On August 16, 1966, the Indiana Stream Pollution Control Board adopted a policy opposing the dumping in Lake Michigan of dredged material which contains substances that are polluting in character, whether they be of organic material or of petroleum sources. It is recognized dredging of harbors must continue in order to maintain navigation.

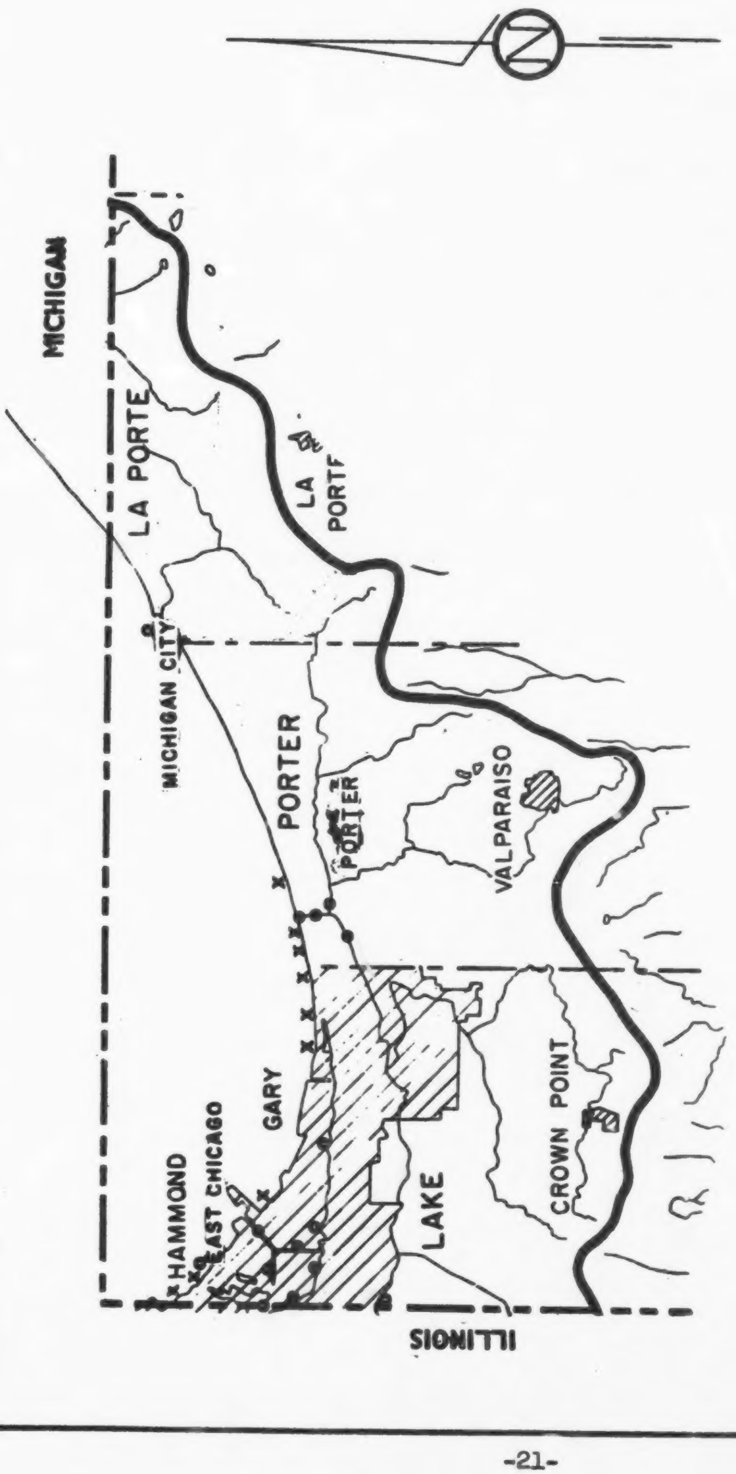
There should be close cooperation by the States and other affected agencies with the Corps of Engineers in its pilot program. It is recommended that a timetable for the discontinuance of disposal in the lake of dredged materials which are polluting in character be adopted which is similar to the timetables established for municipalities and industries.

8. The alewife problem requires immediate attention to effect satisfactory disposal of dead alewives that are anticipated in the summer of 1968. Measures must be developed and put in operation to abate the alewife population explosion. As this problem is pertinent to all the Great Lakes, effective control measures should be initiated by appropriate Federal agencies with the cooperation of State agencies.

9. In addition to the current problems in Lake Michigan, many future problems

of pollution can be avoided or minimized through a program of coordinated and comprehensive planning for the development of the water resources of the Great Lakes Basin. The newly-created Great Lakes Basin Commission, of which all the Great Lakes States and involved epartments of the Federal Government are members, appears to be the proper vehicle for such coordination.

LAKE MICHIGAN BASIN IN INDIANA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PORTER
PORTER
VALPARAISO
GARY
HAMMOND
EAST CHICAGO
LAKE
CROWN POINT
ILLINOIS

LEGEND:

O -- Water Quality Monitoring Station

X -- Beach Sampling Station

APPENDIX

Appendix
Municipal Waste Treatment Status
Lake Michigan Basin

Municipality	1960 Population	Type of Treatment	Year Completed	Design Flow MGD	Present Flow MGD	Receiving Stream
Chesterton	4,335	Activated sludge, chlorination	1963	1.50	1.06	Little Calumet River, Burns Ditch, Lake Michigan
Crown Point	8,443	Activated sludge, chlorination	1966*	1.80	0.90	Beaver Dam Ditch, Deep River, Little Calumet River, Lake Michigan
Dyer	3,993	Activated sludge, chlorination	1966	0.60	0.30	Plum Creek, Little Calumet west to Grand Calumet in Illinois
East Chicago	57,669	Activated sludge, chlorination	1960*	20.00	11.50	Grand Calumet River, Lake Michigan
East Gary	9,309	Trickling filter, chlorination	1960*	1.30	1.00	Burns Ditch, Lake Michigan
Gary	178,320	Activated sludge, chlorination	1965*	60.00 (+20.00 additional primary capacity)	42.50	Grand Calumet River, Lake Michigan
Hammond	111,698	Activated sludge, chlorination	1964*	36.00	35.10	Grand Calumet River west to Illinois
Griffith	9,483)	Served by Hammond Sanitary District				
Highland	16,284)					
Munster	10,313)					
Whiting	8,137)					

Appendix 3 - continued
Municipal Waste Treatment Status
Lake Michigan Basin

Municipality	1960 Population	Type of Treatment	Year Completed	Design Flow MGD	Present Flow MGD	Receiving Stream
Hobart	18,680	Activated sludge, chlorination	1962*	2.00	1.30	Deep River, Burns Ditch, Lake Michigan
Michigan City	36,653	Activated sludge, chlorination	1956**	15.00	12.00	Trail Creek, Lake Michigan
Porter	2,189	None	--	--	--	Calumet River, Burns Ditch, Lake Michigan
Schererville	2,875	Activated sludge, chlorination	1965	0.86	0.30	Hart Ditch, Little Calumet River west to Grand Calumet in Illinois
Valparaiso	15,227	Activated sludge, chlorination	1954	2.00	2.35	Salt Creek, Little Calumet River, Burns Ditch, Lake Michigan

* Major Improvements
** Major Improvements Under Construction

The incorporated municipalities of Beverly Shores, Dune Acres, Long Beach, Michiana Shores, Portage, New Chicago, Ogden Dunes, and the Town of Pines have public water supplies and no recognized sewer systems.

Appendix
Industrial Waste Treatment and Control Facilities
Lake Michigan Basin

Industry and Location	Sewage Disposal Facilities	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Grand Calumet River - Indiana Harbor Ship Canal - Lake Michigan					
Northern Indiana Public Service Company, Bailly Station Baileytown	Septic tank-absorption system	Ash disposal with soil absorption of sluicing water	A	--	Lake Michigan
American Steel Foundries Co. East Chicago	East Chicago Sanitary District	Settling basin	A	.500	Indiana Harbor Ship Canal
Blaw Knox Company East Chicago	East Chicago Sanitary District	Settling tank and filter	A	.425	Indiana Harbor Ship Canal
Cities Service Oil Company East Chicago	East Chicago Sanitary District	Oil separation tanks, ammonia-sulfide strippers, and separate disposal of waste caustic and acids	I	73	Grand Calumet River
E. I. du Pont de Nemours & Company, Inc., East Chicago	East Chicago Sanitary District	Acid neutralization facilities, settling basin, and controlled discharge	I	9.60	Grand Calumet River
Inland Steel Company East Chicago	Three trickling filter plants with effluent chlorination	Coke plant cooling water recirculation, phenol extraction, napthalene recovery, and discharge of ammonia still wastes to East Chicago Sanitary District sewers, scale pits, oil separator, flue dust thickeners, and chemical clarification facilities	I	900.00	Indiana Harbor Ship Canal and Lake Michigan

Appendix - contimued
Industrial Waste Treatment and Control Facilities
Lake Michigan Basin

Industry and Location	Sewage Disposal Facilities	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
M & T Chemicals Company East Chicago	Septic tank-absorption system	Spent caustic sold for recovery and settling pond	I	.075	Indiana Harbor Ship Canal
Mobil Oil Company East Chicago	East Chicago Sanitary District	Oil separators, ammonia sulfide stripper, in-plant control, ballast tank oil separator, and separate disposal of waste caustics and acids	I	2.50	Indiana Harbor Ship Canal
Sinclair Refining Company East Chicago	East Chicago Sanitary District	Oil separators, ammonia sulfide stripper, in-plant control, ballast tank oil separator and separate disposal of waste caustics and acids	I	5.50	Indiana Harbor Ship Canal
U. S. Gypsum Company East Chicago	East Chicago Sanitary District	Settling basin and save-all clarifiers	A	4.50	Indiana Harbor Ship Canal
Union Carbide Chemical Corp. Linde Air Division East Chicago	East Chicago Sanitary District	Settling ponds and oil separation	A	.250	Indiana Harbor Ship Canal
Youngstown Sheet and Tube Co. East Chicago	East Chicago Sanitary District	Scale pits, oil separators, phenol extraction, napthalene recovery, flue dust thickeners, disposal of waste pickle liquor and halogen line solutions on slag fill and lagoon	I	250.00	Indiana Harbor Ship Canal and Lake Michigan

Appendix - continued
Industrial Waste Treatment and Control Facilities
Lake Michigan Basin

Industry and Location	Sewage Disposal Facilities	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
American Bridge Division U. S. Steel Corporation, Gary	Gary Sanitary District	None	A	--	Grand Calumet River
Gary Sheet and Tin Mill U. S. Steel Corporation, Gary	Gary Sanitary District	Scale pits, waste pickle liquor absorption lagoon and oil separators	I	63.00	Grand Calumet River and Lake Michigan
Gary Steel Works U. S. Steel Corporation, Gary	Gary Sanitary District	Scale pits, flue dust thickeners, settling basins, seepage lagoon, and discharge of portion of coke plant wastes to Gary Sanitary District	I	370.00	Grand Calumet River and Lake Michigan
National Tube Division U. S. Steel Corporation, Gary	Gary Sanitary District	None	I	41.0	Grand Calumet River
Northern Indiana Public Service Company, Mitchell Station, Gary	Septic tank-subsurface sand filter	Fly ash and bottom ash settling ponds	A	440.00	Lake Michigan
Steiner Tissue Division Georgia-Pacific Corporation Gary	Gary Sanitary District	Save-all clarifiers	I	1.00	Grand Calumet River
Universal Atlas Cement Company U. S. Steel Corporation, Gary	Trickling filter plant	Oil separation	A	12.00	Lake Michigan

Appendix - continued
Industrial Waste Treatment and Control Facilities
Lake Michigan Basin

Industry and Location	Sewage Disposal Facilities	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Vulcan Materials Company Gary	Septic tank-absorption system	Spent caustic sold for recovery	A	—	Grand Calumet River
American Maize-Products Co. Hammond	Hammond Sanitary District	In-plant control, anaerobic lagoon, aerated lagoon, starch filtrate clarifiers, chlorination, and some waste discharged to Hammond sewers	I	14.00	Lake Michigan
Calumet Nitrogen Products Co. Hammond	Hammond Sanitary District	Settling pond-discharge of some waste into the Hammond sewers	A	.350	Indiana Harbor Ship Canal
Commonwealth Edison Co., Inc. Hammond	Chicago Sanitary District	Fly ash settling bins and bottom ash settling basins	A	1000.00	Lake Michigan
American Oil Company Whiting	Whiting sewers	Oil separators and aerated lagoon	I	140.00	Lake Michigan
Union Carbide Chemical Corp. Chemicals Division Whiting	Whiting sewers and East Chicago Sanitary District	Oil separators, settling basins, and in-plant control	I	54.00	Lake Michigan and Indiana Harbor Ship Canal
Union Tank Car Company Whiting	Septic tank-absorption system	Oil separation	I	.030	Indiana Harbor Ship Canal

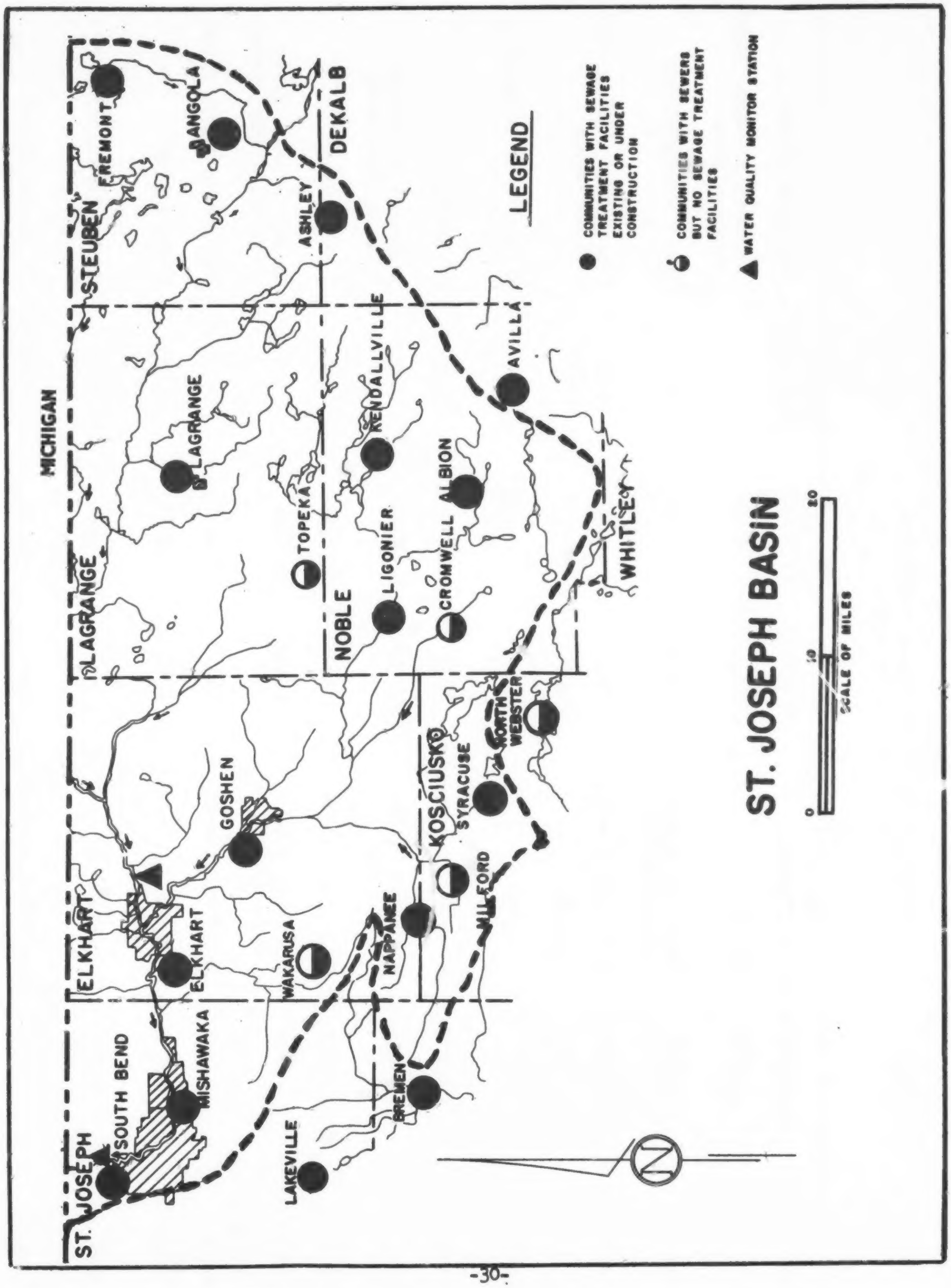
Appendix - continued
Industrial Waste Treatment and Control Facilities
Lake Michigan Basin

Industry and Location	Sewage Disposal Facilities	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Little Calumet River - Burns Ditch - Lake Michigan					
Bethlehem Steel Corporation Burns Harbor Plant Chesterton	Activated sludge, chlorination and discharge to terminal lagoon	Scale pits, chemical flocculation-clarification units, oil separators, acid neutralization, deep well disposal system, cyanide isolation facilities and terminal lagoon	A	130.00	Little Calumet River
American Chemicals Company Griffith	Septic tank-absorption system	Waste holding lagoon	I	--	Tributary Turkey Creek
Great Lakes Dressing Plant Michigan City	Septic tank-absorption system	Ridge and furrow irrigation	A	--	Trail Creek
American Cyanamid Company Michigan City	Septic tank-absorption system	Settling basins and deep well disposal system	A	--	Trail Creek
Northern Indiana Public Service Company, Michigan City	Septic tank-absorption system	Ash settling ponds	A	--	Lake Michigan
Phillips Drill Company Michigan City	Septic tank-absorption system	Oil separator	I	.025	Trail Creek
Royal Metal Corporation Michigan City	Activated sludge	Ion exchange, settling tank and settling lagoon	A	.040	Trail Creek

Appendix - continued
Industrial Waste Treatment and Control Facilities
Lake Michigan Basin

Industry and Location	Sewage Disposal Facilities	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Midwest Steel Division National Steel Corporation Portage	Activated sludge with chlorination	Cyanide isolation facilities, chemical treatment with clarification, and deep well disposal system	A	4.5	Burns Ditch
Little Calumet River (West)					
Simmons Company Munster	Hammond Sanitary District	Cyanide destruction and chromium reduction	A	—	Little Calumet River
Grand Calumet River (West)					
Adolph Plating, Inc. East Chicago	East Chicago Sanitary District	Cyanide isolation facilities	I	.075	Grand Calumet River
LaSalle Steel Company Hammond	Hammond Sanitary District	Acid neutralization and clarification	A	—	Grand Calumet River
Wolf Lake					
Lever Brothers Company Hammond	Hammond Sanitary District	In-plant control, air flotation, effluent chlorination, and discharge of some waste to the Hammond Sanitary District	I	9.7	Wolf Lake

A - Adequate
I - Inadequate



ST. JOSEPH BASIN

MICHIGAN
ST. JOSEPH
ELKHART
LAGRANGE
STEUBEN
DEKALB
NOBLE
KOSCIUSKO
WHITLEY
SOUTH BEND
MISHAWAKA
ELKHART
GOSHEN
LAGRANGE
FREMONT
ANGOLA
ASHLEY
KENDALLVILLE
AVILLA
TOPEKA
LIGONIER
CROMWELL
ALBION
LAKEVILLE
WAKARUSA
NAPPANEE
BREMEN
MILFORD
SYRACUSE
NORTH WEBSTER
N
LEGEND
COMMUNITIES WITH SEWAGE TREATMENT FACILITIES EXISTING OR UNDER CONSTRUCTION
COMMUNITIES WITH SEWERS BUT NO SEWAGE TREATMENT FACILITIES
WATER QUALITY MONITOR STATION
0
10
20
SCALE OF MILES

Appendix
Municipal Waste Treatment Facilities
St. Joseph River Basin

Municipality	Population	Type of Treatment	Year Completed	Design Flow MGD	Present Flow MGD	Receiving Stream
Albion	1,325	Lagoon	Under const.	0.15	--	Tributary to South Bend, Elkhart River
Angola	4,746	Trickling filter, chlorination	1963(1)	0.85	0.8	Pigeon Creek, Pigeon River
Ashley	721	Activated sludge, 7-day tertiary lagoon	1966	0.08	0.05 (est.)	Tributary to Turkey Creek, Pigeon River
Cromwell	451	None	--	--	--	Turkey Creek, Elkhart River
Elkhart	40,274	Primary, chlorination	1955	12.00	12.00	St. Joseph River
Fremont	937	Trickling filter, chlorination	1958	0.15	0.12 (est.)	Tributary to Crooked Creek, Fawn River
Goshen	13,718	Activated sludge	1963(1)	3.50	2.40	Elkhart River
Kendallville	6,765	Trickling filter, chlorination	1958(1)	1.44	1.40	Henderson Lake, North Branch, Elkhart River
LaGrange	1,990	Trickling filter	1958	0.38	0.185	Fly Creek, Pigeon River
Ligonier	2,595	Primary	1941	0.20	0.25 (est.)	Elkhart River
Milford Junction	1,167	None	--	--	--	Turkey Creek, Elkhart River
Mishawaka	33,361	Activated sludge, chlorination(1966)	1952	8.30	9.00(2)	St. Joseph River

Appendix - continued
Municipal Waste Treatment Facilities
St. Joseph River Basin

Municipality	Population	Type of Treatment	Year Completed	Design Flow, MGD	Present Flow MGD	Receiving Stream
Nappanee	3,895	Activated sludge, chlorination	1963	0.90	0.70	Tributary to Turkey Creek, Elkhart River
South Bend	132,445	Activated sludge Additional primary treatment	1955	24.00 24.00	32.00(2)	St. Joseph River
Syracuse	1,595	Trickling filter, chlorination	1962	0.25	0.20	Turkey Creek, Elkhart River
Topeka	600	None	--	--	--	Little Elkhart River
Wakarusa	1,145	None	--	--	--	Baugo Creek, St. Joseph River

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(1) Last major improvement
(2) All dry weather sewage flow is receiving secondary treatment

NOTE: The incorporated municipalities of Middlebury, Millersburg, and Wolcottville, with public water supplies and no recognized sewer system will need to provide adequate sanitary sewer systems and sewage treatment facilities in the near future.

Appendix
Industrial Waste Treatment Control Facilities
St. Joseph River Basin

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Angola Reduction Company Angola	Septic tank - absorption system	Grease separation basin and septic tank	A	0.010	Silver Lake
Weatherhead Corporation Angola	Angola Sewer	Oil separation, ion exchange with water reuse, cyanide destruction, chromium reduction, and cyanide isolation facilities	I	0.175	Tributary of Crooked Lake
Bristol Band Instrument Company Bristol	Septic tank - absorption system	Cyanide control and soil absorption	I	0.010	
Continental Can Company Elkhart	Elkhart Sewer	Bar screens, air flotation and sludge lagoons	I	4.0	Elkhart River
Elkhart Packing Company Elkhart	Septic tank - absorption system	Grease separation, blood collection, and soil absorption pond	A	0.040	
New York Central System Elkhart	Elkhart Sewer	Oil separation and soil absorption ponds	I	0.050	Honey Creek
John L. Whisler and Son, Inc. Elkhart	Septic tank - absorption system	Fine screens, blood collection, grease separation, and soil absorption ponds	A	0.150	Yellow Creek

Appendix - continued
Industrial Waste Treatment Control Facilities
St. Joseph River Basin

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Penn Electric Switch Company Goshen	Goshen Sewer	Cyanide control and settling tank	I	0.225	Rock Run
Pine Manor, Inc. Goshen	Goshen Sewer	Grease separation, blood collection, and soil absorption pond	A	0.040	
Kendallville Fertiliser Company Kendallville	Septic tank - absorption system	Septic tanks and waste stabilization pond	A	0.020	Henderson Creek
Middlebury Co-operative Creamery, Inc. Middlebury	Septic tank - absorption system	Septic tanks and broad irrigation	I	0.025	Little Elkhart River
Cecil Foods, Inc. Milford	Septic tank - absorption system	Soil absorption pond	A	0.020	
Maple Leaf Farm Processing Plant Milford	Septic tank - absorption system	Broad irrigation	A	0.030	
Indiana-Michigan Electric Company Twin Branch Station Mishawaka	Septic tank - absorption system	Ash settling ponds	A	84.0	St. Joseph River
Jentz Manufacturing Company Mishawaka	Septic tank - absorption system	Cyanide isolation	A	0.030	St. Joseph River
Rockwell-Standard Corporation Mishawaka	Treatment with industrial waste facilities	Acid neutralisation, sludge lagoon, chemical treatment, flocculation, and clarification	A	2.00	St. Joseph River
U. S. Rubber Company Mishawaka	Mishawaka Sewer	In-plant control, primary clarification, chemical treatment, flocculation, clarification and vacuum filtration	A	1.300	St. Joseph River

Appendix - continued
Industrial Waste Treatment Control Facilities
St. Joseph River Basin

Industry	Sewage Disposal	Industrial Waste Facilities	Status	Waste Flow mgd	Receiving Stream
Animal By-Products Corporation New Carlisle	Septic tank - absorption system	Soil absorption pond	A	0.020	
New Paris Creamery Company New Paris	Septic tank - absorption system	None	I	0.225	Turkey Creek
Polo Produce, Inc. New Paris	Septic tank - absorption system	Fine screens, blood collection, grease separation, and soil absorption pond	A	0.050	
Gentner Packing Company South Bend	Septic tank - absorption system	Blood collection, grease separation, and anaerobic-aerobic waste stabilization pond system	I	0.215	Autin Ditch
Weatherhead Corporation Syracuse	Syracuse Sewer	Cyanide destruction and cyanide isolation	A	0.225	Turkey Creek

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A - Adequate
I - Inadequate

MR. STEIN: As usual, a very excellent and comprehensive and incisive report.

Are there any comments or questions?

I have three, and I hope they are three short ones.

One, did the Federal Republic Steel case have any effect on the change of the steel company's operations as far as you know?

MR. MILLER: I don't know that I understand the question, Murray.

MR. STEIN: Do you remember when they had that Republic Steel case on the dumping of the material that they had to dredge out? Did that ever change internal operations and reduce the material put out in the streams?

MR. MILLER: The Republic Steel Company I think you are talking about is located on the Calumet River in Illinois.

MR. STEIN: Yes.

MR. MILLER: And I am not familiar with what happened there.

MR. STEIN: I think you may be right on that.

Do you know, Mr. Klassen, if they had

any reduction--

MR. KLASSEN: Up to this point, Mr. Chairman, I really was straining to hear what you said. You weren't speaking in the microphone.

MR. STEIN: Yes, I am sorry.

Did the Republic Steel case, the past Federal action, have any effect on the operations and discharges of Republic Steel into the Illinois waters?

MR. KLASSEN: This I don't know. Republic Steel is under the jurisdiction of the Metropolitan Sanitary District.

(Laughter.)

MR. STEIN: You see the thicket we can get into.

Now I have one more point, and this is something I recognize your State righters do for propaganda reasons, but you talked about the municipal grants and the Federal Government commitment to provide funds. I would like to point out that this was merely a Federal authorization to get a Federal appropriation. The money isn't in the bank. As far as I know, this is not a commitment. If this were a commitment, and I know how you Hoosiers feel about big Federal expenditures, I would like you to add up sometime all the authorizations the Congress has ever made and if we have a budget to meet those authorizations, I wonder how you would like that kind of commitment.

So I think we both understand that process and I recognize that if the people representing the State governments want to say that is a commitment, that is all right.

Now, one other brief comment--

MR. HOLMER: Mr. Chairman.

MR. STEIN: Yes.

MR. HOLMER: Are you saying that the authorization is not a commitment?

MR. STEIN: I surely am. If it were a commitment, you would be able to take us to court and get your money. No authorization, just a mere authorization, is a commitment. As far as I am concerned, that is a hunting license and you have to make that come up in an appropriation.

A lot of these fellows have been for years working on specific water projects and getting them through and getting authorizations

PERRY MILLER

many years in advance, and it took them five, six, seven, ten years to get an appropriation.

I don't think this is peculiar to this program or peculiar to the Federal Government, but I think it is in the State too. We have had many wonderful State programs which have been enacted that just didn't get funds.

By the same token, I think Mr. Klassen alluded to something before. Illinois has as good a State water pollution control law as you are going to have in the United States. He talked about asking for funds for the past three legislatures and they're not increasing the funds. I wonder just by passing the law whether the State legislature had this commitment.

It is not a commitment. This is our type of government. And I think there are two processes here, one is the authorization process or the basic law process and the other is the appropriation. You know, in our society we need both and the proof of the pudding is getting up the money. But no commitment is made until the money is appropriated. I think this should be well understood as to how our government operates.

MR. HOLMER: Let me ask one other question about how our government operates, and I will not pursue this facet of it.

I think some of us were left a little confused, and I would just like clarification for my own information from Mr. Klassen, as to the relationship between his Board and the Sanitary District.

Did I understand that you have no jurisdiction in the Metropolitan Sanitary District?

MR. KLASSEN: Let me clarify this.

The Sanitary Water Board law of the State of Illinois gives exemption to the Metropolitan Sanitary District, not by name, but by stating that any Sanitary District with a population of a million or more. The last session of the legislature amended the Sanitary District Act, not the Metropolitan Sanitary District Act, the Sanitary Water Board Act, amended it. We now have authority to set and enforce water quality standards. But the primary responsibility for meeting those standards rests with the Metropolitan Sanitary District. The only jurisdiction that the State of Illinois has over the Sanitary District now is to set and enforce water quality standards, which we have done and are doing.

MR. HOLMER: Thank you.

MR. STEIN: Mr. Holmer.

MR. HOLMER: I have one more comment for you, Mr. Chairman, and that is to point with pride to Wisconsin's appropriation procedure, which might frighten some people but has been fairly satisfactory for Wisconsin.

Our water pollution control assistance to local government is financed by a sum sufficient appropriation. In other words, the treasury is open up to a limit of $6 million. Our present appropriation is only $1 million to meet our obligations, but if it were necessary to go to $6 million a year, that sum has already been appropriated. And if the Federal Congress wants to borrow from Wisconsin's book, they are welcome.

MR. STEIN: I know the U S. Congress has looked to Wisconsin, as to the other States, for many legislative innovations. I suspect if we bring that Wisconsin proposal to our national Legislature they might say that is where the cheese is binding.

(Laughter.)

I notice that your steel company schedule, and this is one we are particularly interested in, dealing with United States Steel, Youngstown and Inland, the way I understood this, you have pared off quite a few dates with the United States Steel Corporation and we are getting a lot closer together.

And Youngstown, as far as I can see, all the applicable dates remain the same, condition unchanged.

And Inland Steel, and I wish them luck, I knew they would do this, the big improvement that they have made is in their deep well.

Otherwise the dates remain the same.

MR. MILLER: I think the one big thing at Inland that still needs to be completed is the terminal--

MR. STEIN: Yes.

MR. MILLER: And if you remember the pictures that FWPCA shows, it even shows that the work has started on the fill for this. So while it is completion in '70, work is currently underway on parts of it.

MR. STEIN: Yes. But that terminal facility, you won't be able to throw the switch until--

MR. MILLER: May '70.

MR. STEIN: It is '70 on your best estimate.

By the way, this terminal facility, at least the plans and the plant and the projection according to all the technical information I have, is a really wonderful thing and should be examined and looked at as a method of finishing off the residual wastes in the Inland Mill.

Any other comments or questions?

MR. KLASSEN: I would just like to ask, I think directed toward you, Mr. Chairman. It refers here to your original timetable with June 1970.

MR. STEIN: Yes, I noticed that.

MR. KLASSEN: I believe--correct me if I am wrong--I believe that this is the original timetable in reference to the State of Indiana, not for the Conferees.

And may I ask you, Mr. Stein, because

you have been the Chairman of the Illinois-Indiana Conference, is the present timetable, the official date of that Conference, December 1968? And what has Secretary Udall done about any change so far as that that was recommended by a three-to-one vote on the September 11 meeting?

MR. STEIN: I did a double take on that too, Mr. Klassen, when Mr. Miller read that. I assume you meant the original timetable for the State, is that it?

MR. MILLER: As I read it, I had some words added and it says, "The original timetable accepted by the Board was--"

MR. STEIN: Yes. Now, Mr. Klassen is entirely correct, the date established by the Federal-State Conference for the lower end of Lake Michigan involving Illinois and Indiana, the Sanitary District and the Federal Government, set December '68 as the date. This date has been endorsed and adopted and recommended by Secretary Stewart Udall. In response to many inquiries Mr. Udall says he has not changed the date nor does he have any present intentions of changing that date.

We, of course, are always open to any additional information, evidence, and the door is always open for discussion.

MR. KLASSEN: Mr. Chairman, I don't want to belabor this point, but this is extremely important to the State of Illinois.

At the September 11 Conference, by a vote of three to one of the Conferees, it was voted to extend this to June 1970. Subsequently, not officially, but unofficially, I read in the paper that this vote was changed three to one the other way.

Now, I directed a communication to Secretary Udall on December 18 on behalf of the Illinois Sanitary Water Board as to what the status is. Is he going to accept the recommendations of the Conferees at the September 11 meeting to extend the deadline? Is he going to reject that recommendation? And, if so, how is that going to fit into the June 1970 date that the Secretary has already approved for Indiana? This is something that we would like clarified.

MR. STEIN: Yes. Well, here, and I

thought, I hoped you had gotten a letter back from the Secretary then.

That meeting you talked about was what month, September?

MR. KLASSEN: September 11.

MR. STEIN: September 11. On September 11 we didn't hold a session of the Conference; we held a progress meeting. At the progress meeting a discussion of the extension of the deadline was held. This progress meeting did not stop there, but we had another day. The second day, as you recall, involved a visit to the United States Steel plant.

Now, after the remarks at that meeting--unfortunately I think you had to leave for an ORSANCO meeting, but the statements we had at the end of the meeting was that three of the Conferees, yourself, Mr. Poston and Mr. John Egan of the Sanitary District, were not in favor of the extension.

We viewed this proceeding as a whole. We gave the results of this to the Secretary. Mayor Daley made an inquiry, and I think the substance of Secretary Udall's response to Mayor

Daley was about as I gave it: He was not extending the deadline nor did he presently contemplate to extend the deadline.

Now, I recognize that you and Mr. Poole may have had a prior commitment that only permitted you to stay for half of that meeting, but the meeting wasn't over yet. We had another day.

MR. KLASSEN: Do I understand that the September 11 meeting was continued on the property of the U. S. Steel Corporation the next day and you voted? If you did, I never heard--

MR. STEIN: No, we don't have any votes on progress meetings. We have an expression of opinion.

Now, there was a 1968 date set. There was an expression of opinion on the--the date was not changed of the previous progress meeting and the views given by the Conferees indicated that they didn't change their mind afterwards. There was no vote. Unless there was positive action, we didn't change any official position, and I am not sure, Mr. Klassen, that at a progress meeting other than a conference we are empowered to do that. There was no change.

In other words, the original Federal date was at the end of December 1968. I think nothing has led the Secretary up to the present time to change his recommendations endorsing that date, and as far as I know after the last progress meeting three of the Conferees indicated their endorsement and satisfaction of that date.

MR. KLASSEN: All right. Then you have answered my question, I believe.

The official date of the Conferees is December 1968 that has been approved by Secretary Udall?

MR. STEIN: That is correct.

MR. KLASSEN: How is that fitting into Secretary Udall's approval of the Indiana deadline of June 1970? It looks like he is approving two dates.

This is all I am asking for, this clarification.

MR. STEIN: I see. As far as I know we are dealing with an enforcement case and Secretary Udall has indicated that he has approved the December 1968 date. That is our enforcement function. That is the date that prevails in this enforcement case.

MR. KLASSEN: You haven't answered my question, but I am not going to belabor it.

MR. STEIN: Are there any further questions or comments?

MR. POSTON: I have a question for Mr. Miller.

MR. STEIN: Yes.

MR. POSTON: It pertains to his No. 5 recommendations, discharge of wastes from watercraft. It indicates that you do not permit watercraft under your boating law to discharge human waste.

Does this mean then that if you included Lake Michigan in your law that it would be unlawful then to discharge any human wastes into Lake Michigan and that you would then be consistent with the ordinance that the City of Chicago has, for example?

MR. MILLER: As I read the boating law, this is what it says, that you cannot discharge human wastes into waters in the State of Indiana, but it excepts Lake Michigan. So if this were taken out it would apply to all the waters in Lake Michigan as well.

MR.POSTON: Did you have any date in mind when you might make the new law applicable to Lake Michigan?

MR. MILLER: Well, again I would come back, we go to the legislature in 1969, and hopefully if it would be enacted then there would be discussions and I at this time couldn't say. But again, it would come back to the passage of a law and then enforcement of it.

MR. POSTON: That is all I had.

MR. STEIN: Are there any comments or questions?

(No response.)

MR. STEIN: If there are none thank you very much.

MR. MILLER: I had one other, Mr. Chairman.

MR. POOLE: We have a brief statement, Mr. Chairman, by the Indiana Attorney General, which Mr. Miller will read while he is up there.

MR. STEIN: All right.

STATEMENT OF THE HONORABLE JOHN J. DILLON
ATTORNEY GENERAL OF
THE STATE OF INDIANA

Prepared for the Federal Conference on the Pollution of Lake Michigan, convened by the Honorable Stewart L. Udall, Secretary of the United States Department of the Interior.

February 5, 1968 - Sherman House - Chicago, Illinois
(Read by Mr. Perry Miller.)

I regret that previous commitments prevent my attendance in person at the Four-State Conference on Pollution of Lake Michigan.

Indiana officials and legislators are firmly committed to the protection of our water resources, including the waters of Lake Michigan on which Indiana has a shoreline of about 45 miles, and the Attorney General has the ultimate responsibility for enforcement of our pollution control program.

The Indiana General Assembly of 1943 created the State Stream Pollution Control Board and subsequent legislatures have strengthened the State pollution abatement program.

In 1967 a new Clean Water program was

enacted which concentrated on a positive approach to pollution abatement. The positive program is threefold:

1. It exempts from the property tax rolls facilities for water pollution control installed and operated by industrial plants in Indiana.
2. It grants State funds to cities and towns equal to 25 percent of the cost of municipal sewage treatment facilities.
3. It provides for and requires the certification of operators of sewage and industrial waste treatment facilities.

Indiana's Clean Water program, including standards, inducements and enforcement, was approved by the United States Department of the Interior in July 1967.

As one of four States adjacent to Lake Michigan, Indiana shares with Illinois, Michigan and Wisconsin in the benefits of this priceless natural resource and in the responsibility for its protection.

The Attorneys General of our four States met in Chicago, November 3, 1967, to discuss our common enforcement problems and procedures for pollution abatement of Lake Michigan. I understand that copies of the statement issued at that November 3 meeting have been distributed by Attorney General Frank J. Kelley of Michigan to Conferees at this present meeting.

You will see from that statement that the four Attorneys General agreed (1) to identify the polluters of Lake Michigan from their respective States, (2) to make this information mutually available, and (3) to cooperate in concerted enforcement actions against the identified polluters.

A list of Indiana polluters has been compiled by the State Stream Pollution Control Board. I trust it will be made available to this conference as well as to the chief legal officers of Illinois, Michigan and Wisconsin. The four Attorneys General expect to meet together in the very near future to plan and implement a vigorous four-State enforcement program against major polluters.

I appreciate the opportunity given my office to participate in the present conference, and I join the Governor of our State in pledging Indiana cooperation in the effort to preserve the waters of Lake Michigan.

- - -

MR. STEIN: Thank you.

I have one more question that relates to your previous statement.

There has been some question raised from time to time on your industrial waste information. For the purpose of enforcement action, I have always found the detailed reports and open records of Indiana completely satisfactory for our purposes. I would commend some of the States on reporting techniques, not necessarily the States here, but some of the other States, because I think it is just fine. I think I can put my finger on every plant and every mill within the Federal enforcement area and be able to answer a question as to what is occurring. So far as we are concerned, we are eminently satisfied with the information and reporting.

Now, I would like to ask Mr. Poston a question.

Mr. Poston, are you satisfied with the industrial waste data you are getting from Indiana?

MR. POSTON: Very much so, We have been down recently and reviewed the information in connection with this report, and for general perusal of the data as to its adequacy, and we find that it is very adequate for our purposes.

MR. STEIN: Thank you.

MR. MILLER: Thank you very much.

MR. STEIN: Thank you, Mr. Miller.

(Applause.)

MR. STEIN: Mr. Poole.

MR. POOLE: Next I am going to call on Marjory Crawford, who represents Save the Dunes Council. She has told me she will hold it to three to five minutes.

STATEMENT OF MARJORY CRAWFORD
BOARD MEMBER
SAVE THE DUNES COUNCIL

MRS. CRAWFORD: Mr. Chairman, members of the panel. My name is Marjory Crawford. I am a Board Member of Save the Dunes Council and the statement I am about to read represents the views of Save the Dunes Council.

The Save the Dunes Council was formed in 1952 for the purpose of preserving the Indiana dunes for public use in essentially its natural state. This basic objective was realized with the establishment of the Indiana Dunes National Lakeshore.

The current goal of the Save the Dunes Council is to protect the basic purpose, aims and objectives of the Indiana Dunes National Lakeshore. The purity of the waters of Lake Michigan is obviously an important part of this goal.

For the past 16 years, we have personally witnessed the deterioration of Lake Michigan which has accelerated over the past five years. Within this relatively short period of time, the visible amounts of pollutants such as oil, debris, seaweed, and algae have increased alarmingly.

Approved water quality standards are a base from which to build stricter standards. We request that all of Lake Michigan be classified for "whole body" contact. To do otherwise in outer waters and harbor vicinities is, in effect, a license to pollute. We oppose this.

Lower water quality standards for waters adjacent to industrial areas in northern Indiana will obviously adversely affect the beaches of the Indiana Dunes National Lakeshore as well as all other existing public and private beaches in this area. There can be no walls or dikes erected between waters polluted and waters unpolluted.

In addition to combating present pollution problems, our advancing technology is creating at least one new problem for the 1970s. Presently planned or authorized for the Indiana-Michigan shoreline are four nuclear power generating plants. The threat of thermal pollution of Lake Michigan by discharge of superheated cooling water from such plants must be examined carefully and safeguards must be set up. Prevention is much cheaper than cure.

Of a more urgent nature is the present situation. We have learned that while Illinois steel mills and other industries will meet the water pollution deadline, Indiana steel companies claim that they need "more time" to build pollution

MARJORY CRAWFORD

abatement facilities--two more years, in fact. We wonder what the Indiana steel companies have been doing the past two years while the Illinois companies were preparing for and expecting to meet the 1968 deadline. Perhaps the Indiana steel companies believed that the Indiana water pollution enforcement agency would back down in the face of a united "foot-dragging" campaign. In fact, this seems to be just what is happening.

We have personally observed the steel companies design and construct a completely new steel mill complex in less time than they now claim they need to install pollution abatement equipment. When Bethlehem Steel wanted to level the Indiana Dunes, hundreds of vehicles, operating day and night, destroyed in six months what it took Nature 10,000 years to create. With such technological ability at hand, we are nevertheless told by the steel companies that it will take many years to clean up the filth being discharged into Lake Michigan.

We believe there is no excuse for not meeting the 1968 deadline. We ask for an accelerated construction schedule for facilities which will help safeguard the health of the American people.

Zone standards presently proposed are designed to decelerate the rate of increase of pollution. These must be rapidly supplemented by effluent standards designed to eliminate all discharge of pollutants into the lake. We will accept nothing less than cessation of all pollution of Lake Michigan. Then hopefully we can begin the difficult task of restoring Lake Michigan to its former purity.

Thank you.

MR. STEIN: Thank you.

Are there any comments or questions?

(No response.)

MR. STEIN: Thank you very much.

Mr. Poole, I wonder if you would give me just a few seconds. I have a message here from one of my many bosses, but some messages, as they say, are more immediate than others. This is from Congressman John C. Kluczynski,who is a member of the Public Works Committee. And you know, we go before the Public Works Committee, at least I do.

CONGRESSMAN JOHN C. KLUCZYNSKI

STATEMENT OF THE HONORABLE JOHN C. KLUCZYNSKI
U. S. HOUSE OF REPRESENTATIVES
FIFTH DISTRICT ILLINOIS

Thank you very much for giving me the opportunity to join you in this discussion of what can and must be done, and what I am confident will be done, to insure the life of our lakes. On Tuesday of this week, Colonel Anderson of the Corps of Engineers met with several of the members of the Illinois Congressional delegation in my office to give us a briefing on the information that General Tarbox presented on behalf of the Corps of Engineers here in Chicago this week. This is going to be an expensive program, and a long term one, but I am satisfied that the Corps of Engineers, as well as all of the other Federal and State agencies involved, are planning their future work carefully to give us as much help as possible on preventing future pollution and cleaning up what already exists.

The Public Works Committee, as most of you know, is responsible for Federal legislation dealing with water pollution, and I can assure you that we will continue to keep a close watch on everything that is done. We know how big this problem is, not only for Lake Michigan but throughout the Nation, and I know that every member of the Public Works Committee shares my personal determination to see that the water pollution control programs are carried out.

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MR. STEIN: Mr. Poole.

MR. POOLE: I will call on Mr. Gene Minney, who represents the Indiana Division of the Izaak Walton League. He has told me 15 minutes, 20 minutes as a maximum.

STATEMENT OF E. EUGENE MINNEY
REPRESENTING THE INDIANA DIVISION
THE IZAAK WALTON LEAGUE OF AMERICA

MR. MINNEY: Mr. Chairman, representatives of the different States and organizations that are interested in water pollution.

My name is Gene Minney. I am President of the inner chapter group in Lake County, which consists of 15 organizations. I am also on the

Committee on Air and Water Pollution, State of Indiana, representing the Division.

Just a word to Mr. Stein. If you ever have any trouble with that cheese that is binding, we would like to invite you over to our section and drink a little of that water. I guarantee you it might unbind that cheese that is binding.

(Laughter.)

I am appearing here today on behalf of the Indiana Division of the Izaak Walton League of America and for our organization's Water Quality Task Force, of which I am a member.

The posture of the League throughout the course of hearings in all parts of the State on water quality is well established and well known to the Board and other State and Federal agencies dealing with the problems of environmental pollution.

By reference, our statement today includes recommendations in our general letter of September 7, which was given to the Indiana Stream Pollution Board, especially in regard to water temperature and tolerable chemical pollutants, by our water quality chairman, Mr. Wayne Stapf. This letter is already in the records of the Board. By reference, the Indiana Division and its Water Quality Task Force also support and endorse the statement of the Glen Park Chapter of the League, our largest Lake County unit, which has maintained a strong and continuing interest in the problems of water and air pollution in this area and elsewhere. That statement will be offered at this hearing.

I cannot overemphasize the League's position that DILUTION IS NOT THE SOLUTION TO POLLUTION. We have reiterated this position at every hearing, and that policy is thoroughly established throughout our national organization. In March of 1965, some of us attended a pollution conference in Chicago, attended also by officials of your Board. At that time a number of interests claimed a high degree of effluent purity. As testimony developed, however, it was learned that a number of such claims were based upon pumping great quantities of clean Lake Michigan water into some form of receiving area for purposes of mixing toxic and obnoxious materials, after which the mixed solution was discharged to the lake.

The percentage of pollution was related not to the removal or reclamation of polluting materials, but to how much water might be drawn in to dilute it. The Izaak Walton League thoroughly disagrees with this method of handling wastes; and we would infer that the Board would not approve such techniques in its implementation and enforcement program.

Our position, well stated by the Glen Park Chapter, is that both the outer and shore waters of Lake Michigan should meet all tests for whole body contact at all times. All shoreline areas, especially which are now used in any way for public recreation, or which are authorized by Federal legislation for that purpose, must be restored and maintained to meet this use. Under no conditions should any such areas be permitted to fall below whole body contact nor a quality required for sustained, reproducing communities of aquatic life which would occur at the natural temperatures of the lake.

We would like to make special reference at this point to the dumping of polluted dredged materials into Lake Michigan under auspices of the Army Corps of Engineers. And may I say that many conservationists these days cannot utter the words "Army Corps of Engineers" without a slight feeling of nausea. It is just getting terrible. You find any stream that is to be straightened out, any dam that is to flood some beautiful valley, the natural sandstone ledges of the Kankakee River, which they want to dynamite right now, and in good old Hoosier vernacular, you find the Corps of Engineers sitting right smack dab in the middle of the muddy puddle.

Now, as I say, we would like to make special reference at this point to the dumping of polluted dredged materials into Lake Michigan under the auspices of the Army Corps of Engineers. Our March 12 State director's meeting in Evansville, Indiana, took direct action on this question, and since it is relevant to the purpose of this hearing, we ask that it be inserted in the record at this point. I will not read the resolution, but it opposes this dumping and calls for an immediate halt, not today, not next week, but last week. We were, I would like to add, dismayed by a recent statement in the Senate Congressional Record in which Senator Vance Hartke indicated this dumping practice would be halted forthwith; he based this forecast upon a joint statement said to have been issued by the Army Engineers and the Department of the Interior. However, we read that joint statement, and found no commitment whatever for halting this dumping now. The statement said the matter would be studied, as usual. The Izaak Walton League is on record calling for a halt to this right now; if it is not stopped, the recreational qualities of the entire southern tip of Lake Michigan are jeopardized.

Since it bears upon a water use, we would also wish to introduce for the record two additional resolutions adopted by our March 12 Board session; and I add that all three of these resolutions were approved unanimously. The first of these latter two supports a free-flow stream condition for the Little Calumet River east of the Portage-Westchester boundary for which we also request quality amendments for whole body contact and cold water aquatic life; and the second supports the principles of two Federal measures, HR25 and S695, the estuarine bills. Among the provisions of these measures are requirements for Department of the Interior approval for any lake filling of estuarine areas, including the shorelines of the Great Lakes.

It is relevant in our testimony at this time to refer also to new methods of waste disposal in this basin. We refer to the technique of "needling" waste liquors into deep well disposal areas. It is our understanding that three permits have been issued for this technique, and that disposal is into Precambrian rock some 4,000 feet below the surface along Lake Michigan. The Izaak Walton League has not opposed this approach, but we would want our concern to be part of the record. It could be argued that the effluent from any one plant poses no problem; and we understand that there are assurances that injection of materials into this layer will never pose a threat to surface waters. However, these assurances would be difficult to confirm. And who in God's name wants to take the responsibility of pumping this into the strata with a chance of it coming up again in 10, 15, 20 or 30 years?

The world stood on its hind legs to condemn Hitler for murdering millions of Jews, but I wonder how many people we would be murdering if this poison came to the surface and it was in our surface water. We point out that this method appears to be more an alternative to releasing pollutants into surface streams than it is a method of separating and recovering waste materials.

A member of our State Water Quality Task Force, Dr. William Eberly, an eminent aquatic biologist of Manchester College, has recommended that the appropriate public agencies should develop testing stations in connection with deep well disposal in such a way as would firmly corroborate the general opinion that this is a safe way to handle the problem. We fully support this proposal, and point out that an error in judgment today, especially in its needling process, could create an irreversible and catastrophic pollution problem for tomorrow. The fact that none of us here today may live to see the day when the error becomes evident is neither a moral nor an ethical argument against being sure what we are doing is right. Therefore, we ask that as part of the implementation and enforcement program, the State, in conjunction with the Federal Government, develop and install a testing system which will confirm or contradict the deep well approach as a viable alternative to surface treatment and elimination of toxic materials.

We note in the Board's recommendations, that is the pollution board of the State of Indiana, on page 7 that reuse of water is suggested wherever possible. We strongly subscribe to this idea, and think it is inherent in any conservation-oriented program.

We generally concur with regulations proposed by the Board, insofar as we understand them to be within limits which will permit a well-balanced, healthy and sustained aquatic life population and limited contact recreational uses for all the waters of the basin as a bottom threshold quality--in addition to direct contact qualities called for above. We assume that the Board includes swimming and whole body contact in its first item under summary of uses when it says "water-oriented recreation" in the discussion of Lake Michigan.

The Izaak Walton League supports the implementation and enforcement recommendations, but does not concur with paragraph 5, insofar as the period for achievement is specified. Indefinite words like "some", "not all", "as soon as practicable", is no requirement at all, or the words "most", "in most cases." This is not a requirement in any sense of the word. That is about as indefinite as you can get. We refer to the December 1966 promulgation from the Federal Water Pollution Control Administration which states no plan will be accepted which does not provide the remedy within five years except in very extenuating circumstances, and even then not more than ten years. Combined storm and sanitary sewers were among the few conditions which FWPCA cited in the 10-year region. A time limit should be established for the achievement of all proposed standards, or they will never be brought about.

We are certain that the Board will hear many appeals asking for "more study" and other requests which will delay or even defeat the intent of the Water Quality Act of 1965. It was the intent of Congress in passing this law and the Clean Water Restoration Act of 1966 to move ahead on a definite timetable toward protecting those waters which were not already polluted and restoring those waters which are contaminated. The timetable, as we are sure the Board appreciates, is the key to this whole affair; and that without it, all of the fine standards and criteria are meaningless. And I am sure you agree with me.

We wish to review once again the problems of temperature as that relates to proposed water qualities. We commend the Board for reducing the maximum warm water aquatic life value to 60° F from an original value of 73° F. Dr. Eberly, the Board will find in its records, has stated that a maximum summer temperature should not greatly exceed 80° F; and he has suggested 85° F as the maximum permissible. The Izaak Walton League very strongly supports lowering the 93° F temperature to this lower value. As Dr. Eberly has stated, the higher temperature will have an adverse effect upon "warm water" forms at one or more points in the overall life cycle, and will adversely affect the food chain necessary to sustain such a community. The higher temperature will also affect other environmental conditions which collectively will not serve the desired qualities.

Now we are becoming aware that several utilities and other industries use Lake Michigan waters for cooling; and we are especially mindful of a proposed 800,000 kilowatt nuclear plant in Porter County. Northern Indiana Public Service Company has already agreed to permit aquatic biologists in the Izaak Walton League to review general plans with special emphasis on heat exchange. As yet, we have not been informed of these plans. However, we are as concerned with cumulative effects as with the effects of any one installation; and we assume that the Board has the overall picture in mind. This we assume. No one installation can be considered in a vacuum, and at some point there will have to be a cutoff on thermal pollution. We would suggest that the Board envision now the requirement for cooling towers or lagoons which would receive heated effluents, so that--as Dr. Eberly suggests--the discharge will not be substantially different from that found in the stream or body of water receiving it. And we mean the natural temperatures of these streams and bodies of waters.

As for enforcement, we recommend a system of State-operated monitoring systems. We feel that the State itself should install, operate, read and evaluate the degree of compliance.

The Izaak Walton League recognizes the horrendously polluted condition of the Grand Calumet River, and we have confidence that even the exceptionally poor values contained in SPC7 and SPC8 probably represent an improvement over the frightful present conditions.

I repeat--probably represent an improvement over the frightful present conditions. It could be easier to fly a man to the moon than to clean up this stream. The qualities proposed for this stream would be lethal to a well-balanced warm water aquatic life population, and we ask that the proposed qualities be amended upward to meet the warm water criteria. It will be difficult; but it will never be any easier than it is now, and this objective should be achieved within 10 years.

The intent of the Act which predicated this hearing and the intent of Congress which passed it into law will not likely be served unless this quality is established as an objective. We are fully aware that the State has for all practical purposes reserved consideration of this stream because of the problems involved. Yet the problem must be faced, and today is the time.

For the record, in closing, the Izaak Walton League opposes so-called "admixture" zones and calls for effluent standards wherever the issue of "immediate outfall area" is subject to interpretation.

Many of us are wondering why the United States Government can force industries to use equal opportunity labor, and if they refuse to use equal opportunity labor they pull their contracts. Many conservationists feel that there is no reason why the government can't pull any company's contract that is polluting our waters. Is there any reason why they couldn't? I ask you to think about this, gentlemen.

We support the highest quality of waters as the only acceptable approach to multiple use and public interest. We oppose the designation of any stream or body of water for its lowest common denominator, and that must include the Grand Calumet.

In closing may I say, gentlemen, that the Izaak Walton League appreciates all the hard work that is being done in this area. We are hoping--we are hoping--we are praying on benaed knee that something will come from this, that this won't be just the usual hodge podge and usual run-around.

I would like to say also that over in Indiana most of us feel like we would like to say, "God bless Mr. Udall," for I think he is one of the greatest conservationists that has ever lived.

Thank you.

MR. STEIN: Thank you, Mr. Minney.

(Applause.)

(The following material was submitted

by Mr. Minney.)

RESOLUTION OPPOSING DISPOSAL OF POLLUTED DREDGINGS INTO LAKE MICHIGAN BY THE U.S. ARMY CORPS OF ENGINEERS

WHEREAS, the Izaak Walton League of America for over 45 years has been tireless in its efforts to keep America's waters clean; and,

WHEREAS, Lake Michigan is one of America's greatest reservoirs of fresh clean water, but is in danger of dying prematurely; and,

WHEREAS, the U.S. Army Corps of Engineers has seen fit to dump material dredged from polluted rivers and streams into Lake Michigan; and,

WHEREAS, the Public Health officials have repeatedly warned of the dangers of continuing said dumpings; and,

WHEREAS, the U.S. Department of Interior, the Federal agency responsible for water pollution control, has negotiated with the Corps of Engineers toward the objective of ending said dumpings, despite which, polluted material is still being deposited into Lake Michigan;

NOW THEREFORE BE IT RESOLVED by the

Indiana Division of the Izaak Walton League of America, assembled at Evansville, Indiana, March 12, 1967, that an immediate ending of such dumping be brought about; and,

BE IT FURTHER RESOLVED that the Corps of Engineers be required to include the cost of safe disposal of polluted materials, due to Civil Works Projects in the benefit-cost ratio of such projects, if the cost of safe disposal is not undertaken by local interests or other agencies; and,

BE IT FURTHER RESOLVED that the Indiana Division of the Izaak Walton League of America specifically oppose the practice of attributing "water quality benefits" to the benefit-cost ratio when such "benefits" are achieved by the process of diluting polluted discharges; and,

BE IT FURTHER RESOLVED that copies of this resolution be sent to the Secretary of the Army, U.S. Corps of Engineers, all Indiana Congressmen, and appropriate Federal agencies.

RESOLUTION SUPPORTING FREE-FLOW FOR LITTLE CALUMET RIVER EAST OF PORTAGE-WESTCHESTER BOUNDARY

E. EUGENE MINNEY

WHEREAS, the Indiana Division of the Izaak Walton League of America has long supported and cooperated in the preservation and restoration of productive wildlife habitat, and recognizes the great importance of what remains of unaltered natural environment; and,

WHEREAS, the Little Calumet River provides water recreation for canoeists of many organizations, who traverse the quiet pools and meandering course which is enlivened by sections of skill-testing rapids; and,

WHEREAS, the rich flora of the bottomland and wooded beauty of the adjacent slopes provide solitude and inspiration; and,

WHEREAS, the Little Calumet River is of exceptional historical interest as a major waterway of American Indians and pioneering fur traders; and,

WHEREAS, the Bailly Homestead and Trading Post, a National Registered Historic Site, is situated in almost original condition along the river's banks; and,

WHEREAS, a portion of the river valley extends through the Indiana Dunes National

Lakeshore; and,

WHEREAS, the Porter County Plan Commission and Indiana State law have recognized the importance of maintaining a natural flood plain and park-like buffer for residents of the region; and,

WHEREAS, it is especially important to retain examples of undisturbed natural environment as more and more lands are developed and converted to other uses; and,

WHEREAS, few natural areas remain in this region which have been spared intensive development, such as this portion of the Little Calumet River;

NOW THEREFORE BE IT RESOLVED by the Indiana Division of the Izaak Walton League of America, assembled at Evansville, Indiana, March 12, 1967, that,

1. The Little Calumet River and its natural valley flow condition represents the soundest conservation principle for this resource;

2. The river and its flood plain should be left in their natural state;

3. No project should be instituted

which would destroy, flood or otherwise relegate the present natural qualities of the flood plain and its rich habitat; and,

4. No structures should be considered which would materially affect natural river flow and levels of the Little Calumet River in the Portage-Westchester area.

BE IT FURTHER RESOLVED that this objective also be applied to the Little Calumet River major tributaries, especially Salt Creek and Coffee Creek, portions of which are still worthy of protection; and,

BE IT FURTHER RESOLVED that the Indiana Division of the Izaak Walton League of America favors permanent protection of the Little Calumet River Valley through acquisition of bottomland and adjacent slopes by appropriate agencies as a park or forest preserve; and,

BE IT FURTHER RESOLVED that copies of this resolution be sent to appropriate agencies and officials.

RESOLUTION IN SUPPORT
OF H.R. 25 and S. 695

WHEREAS, legislation has been introduced in the U. S. Congress for the purpose of initiating a nationwide study of estuarine areas by the Interior Department for the purpose of identifying those which ought to be preserved by Federal, State, and/or local action; and controlling modification of estuaries by requiring Interior Department approval of development proposals; and,

WHEREAS, the Izaak Walton League of America has long recognized the importance of estuarine areas for conservation purposes including protection of fish and other aquatic life, wetland animals and birds, and coastal area plant life; and,

WHEREAS, the Izaak Walton League of America has been in the forefront of the efforts to preserve significant portions of coastal areas in a natural state; and,

WHEREAS, coastal marshlands and meadows are important as absorbent areas and flood plains for flood control purposes; and,

WHEREAS, natural shorelines, flood plain areas, and estuarine areas are rapidly being altered by bulkheading and filling large areas not intended for, or necessary to, the recognized legitimate use of shorelines for harbors, docks, or navigation purposes; and,

WHEREAS, such alteration to the natural shoreline, flood plain, and estuarine areas results in water pollution problems, destroys the aforementioned conservation values, and coastal areas of potential park value, and impairs the natural beauty of the surrounding areas; and,

WHEREAS, the coastal areas of the Great Lakes are especially vulnerable to the problems caused by bulkheading and landfills; and,

WHEREAS, the Izaak Walton League of America, by National Resolution of 1960, has declared itself to be opposed to bulkheading and filling of shoreline areas except for public purposes; and,

WHEREAS, the only existing Federal authority exercising control over such coastline alterations is the U.S. Army Corps of Engineers; and,

WHEREAS, the U.S. Army Corps of Engineers has ruled on such alterations primarily on the basis of interference to navigation, and has not given sufficient consideration to interference with conservation values;

NOW THEREFORE BE IT RESOLVED by the Indiana Division of the Izaak Walton League of America, assembled at Evansville, Indiana, March 12, 1967, that the aims and purposes of H.R. 25 and S. 695 are hereby fullv endorsed; and,

BE IT FURTHER RESOLVED that copies of this resolution be sent to the appropriate Federal, State, and local agencies and officials.

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GLEN PARK CHAPTER
THE IZAAK WALTON LEAGUE OF AMERICA, INC.
GARY, INDIANA P.O. Box 1841
APRIL 10,1967

TO: INDIANA STREAM POLLUTION CONTROL BOARD

SUBJECT: WATER QUALITY STANDARDS; LOWER LAKE MICHIGAN, CALUMET RIVER BASIN

FROM: GLEN PARK CHAPTER, IZAAK WALTON LEAGUE OF AMERICA, INC.

GENTLEMEN:

E. EUGENE MINNEY

For over 45 years the Izaak Walton League has maintained a policy of working for clean waters, as part of an overall healthy and productive outdoor environment and the multiple-use concept of all of America's natural resources. It is my privilege today to represent the Glen Park Chapter of the League, located at Glen Park-Gary, Indiana. My name is John "Fred" Blosl, and I am Secretary of the Chapter.

The subject of this hearing is the implementation of the Water Quality Act of 1965, which was strongly supported at all levels of our national organization. This Act requires the States to submit plans for the improvement of all interstate waters to the Federal Water Pollution Control Administration. We appreciate the opportunity to make our position known as to the qualities desirable in the waters of this basin.

Our Division is fully aware that we are working with what may be the worst water conditions in the State of Indiana in this basin. But, the Water Quality Act specifically states that all waters will be improved, and that those waters not yet polluted must be protected in a clean condition.

The Act also states that no proposal by any State which suggests that any stream,or major portion of a stream, be designated for carrying wastes will be acceptable. The water quality which now exists in this basin is completely unacceptable and it is our belief that the authors of the Federal legislation surely must have had this basin, among several others in the Nation, in mind when they wrote the Bill.

All of the waters in this basin should be improved to at least those qualities which will permit and encourage a sustained population of well balanced warm water aquatic life. The Grand Calumet River should be improved to provide for aquatic life, municipal, agricultural, and industrial uses. The Little Calumet River west of the municipal boundary of the Town of Portage and Westchester should be improved to a quality which will provide for aquatic life and limited human contact uses. The Little Calumet River east of the aforementioned boundary should be improved to provide for cold water aquatic life, direct human contact, as well as all other water uses. Wolf Lake should be improved for all water uses, including direct contact human recreation. Deep River, Salt Creek, Turkey Creek, Hart Ditch, Duck Creek, Lake George, and all other intrastate waters should be improved to a quality which will provide for aquatic life, limited human contact, as well as municipal water uses. All of the Lake Michigan shoreline which is now designated for any form of public recreation, including those beaches which are now closed due to pollution problems, and shorelines which will become available when the Indiana Dunes National Lakeshore is established, should be maintained or restored to meet every water quality standard, including direct contact human uses. All of the open waters of Lake Michigan should also be improved to meet the above standards.

In the pollution abatement program, special emphasis must be given to the elimination of both thermal and chemical pollutants, including cyanides, phenols, floating and suspended solids, oils, sludges, and other contaminants which have contributed to the biological death of the waters in this basin. The dumping of industrial and municipal wastes and all dredged and other materials other than from natural sources into these waters must stop. And we ask that steps be taken to eliminate damaging agricultural nutrients and any pesticides which can leach into or otherwise find their ways into these waters. We support the recommendations as suggested in the "Report on Water Quality Criteria, Lower Lake Michigan, Calumet Basin" of January 1966. Dissolved oxygen and other parameters should be maintained at qualities which will permit and encourage a sustained population of well balanced warm water aquatic life.

We believe that the objectives for Wolf Lake, Lake Michigan (both open waters and shore waters) and the Little Calumet River east of the aforementioned boundary should be achieved within four years but in no case longer than eight years. The objectives in all other waters of this basin should be achieved within six years but in no case longer than ten years. And that the time to start this accomplishment is right now. In order to achieve these qualities, it will be necessary for the State of Indiana to install and operate an extensive monitoring system and to develop a strong and clear enforcement program which will make violations prohibitive. We will provide all possible support to the Pollution Control Board in all phases of its implementation program.

Thank you for the opportunity to present the views of the Glen Park Chapter of the Izaak Walton League of America.

John "Fred" Blosl, Secretary
Glen Park Chapter
The Izaak Walton League of America, Inc.

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STATEMENT OF WAYNE C. STAPF
SECRETARY, INDIANA DIVISION
CHAIRMAN WATER QUALITY SUBCOMMITTEE
THE IZAAK WALTON LEAGUE OF AMERICA

September 7, 1966

Mr. Blucher Poole, Technical Secretary
Indiana Stream Pollution Control Board
1330 West Michigan Street
Indianapolis, Indiana

WAYNE C. STAPF

Dear Mr. Poole:

First, on behalf of the Indiana Division of the Izaak Walton League, I wish to thank you for the invitation to our organization to comment on the criteria developed by the Ohio River Valley Water Sanitation Commission, and to suggest criteria which the State may wish to consider in its program related to the Water Quality Act of 1965.

The Indiana Division of the League, with more than 5,000 members in 43 chapters throughout the State, is part of a national organization with a long and vital interest in the problems of water quality.

The basic operating policy of the League--fully supported by its Indiana Division--is found in the following language: "...all water should be fit for direct human use--drinking, swimming, esthetic enjoyment--without special treatment, and it will then be eminently suited for municipal, agricultural and industrial utilization."

The League's national position--fully endorsed by us--adds: "There is no sound justification for water pollution. The people of the

United States are entitled to wholesome water, usable for all human needs."

This League policy is in close parallel with both Congressional intent and the position of the President when he signed the Water Quality Act of 1965: "No one has a right to use America's rivers and America's waterways that belong to all the people as a sewer. The banks of a river may belong to one man or one industry or one State, but the waters which flow between those banks should belong to all the people."

Congress fully intended to enhance the quality of all interstate waters when it passed this Act, and specifically stated that no proposed standards would be acceptable which designated any stream or portion of a stream for the sole or principal purposes of transporting wastes. The Indiana Division of the League subscribes to this intent, and suggests that the only long-range objective which can be considered as viable is the elimination of all waste and polluting material before it is discharged to any body of water having an impact upon the public domain.

In the pursuit of this objective, the

Indiana Division supports the minimum conditions developed by ORSANCO for application to all interstate waters, with certain modifications and additions: That all waters be:

1) Free from substances attributable to municipal, industrial or other sources that will settle to form putrescence or otherwise objectionable sludge deposits deleterious to aquatic life;

2) Free from floating debris, oil, scum, foam or other materials attributable to municipal, industrial, or other sources in amounts sufficient to be unsightly or deleterious to human, animal or aquatic life;

3) Free from materials attributable to municipal, industrial or other sources producing color, odor or other conditions in such degree as to create nuisances, or which will cause substantial contrast with natural appearance;

4) Free from substances attributable

> to municipal, industrial or other sources in concentrations or combinations which are toxic or harmful to human, animal or aquatic life, including but not limited to pesticides, herbicides and detergents.

ORSANCO approved four general classes of stream uses on May 12, 1966: public water supply, aquatic life, industrial water supply, and recreation. In general, our recommendations are based upon parameters suggested by ORSANCO, but we suggest that as a practical matter it may be extremely difficult to differentially classify streams found in the same watershed, as may be envisioned in the ORSANCO recommendations. There is a danger in such closely related streams of necessarily reducing a system of waters to the lowest common denominator. We do not believe such a result was intended in the Act, nor would it be desired by the public which must realize the greatest possible diversity in use of water resources.

Therefore, we feel it would be desirable to incorporate many of the best parameters from the four different classes into a single set of criteria for all waters. We would also observe that the objective of diversified uses is served by the highest standards, while restrictive and limited uses result from lower standards. It is the broadest public benefit which this program should address.

More consolidation of quality standards for all stream waters would appear consistent with the general ORSANCO recommendations that they be "free from substances...toxic or harmful to human or aquatic life."

The following criteria are suggested to become part of the four proposals above dealing with all stream waters of the State:

1. DISSOLVED OXYGEN: Not less than 3 mg/1 or 50 percent saturation, whichever is the higher value;

2. TEMPERATURE: Not to exceed 93°F., May to November; not to exceed 73°F., December to April; but in no case to be raised more than 9°F. above the normal seasonal water temperature;

3. DISSOLVED SOLIDS: Not to exceed

500 mg/l as a monthly average, nor 750 mg/l at any time (800 to 1,200 microhmos/cm at 25°C.);

4. RADIOACTIVITY: Gross beta activity (no Strontium 90 or alpha emitters present), not to exceed 1,000 micromicrocuries at any time;

5. pH: Not below 6.0 nor above 9.5.

6. TOXIC SUBSTANCES: . Not to exceed 1/10 of the 48-hour median tolerance limit, except that other limiting concentrations may be used in specific cases when justified on the basis of available evidence and approved by the appropriate regulatory agency;

7. TURBIDITY: Shall not exceed such levels as will permit natural populations of indigenous aquatic life (20 cm Secchi disk visible at depths to 50 cm suggested).

In addition to these all-stream suggestions, we recommend the following criteria for the four water use classifications proposed by ORSANCO:

PUBLIC WATER SUPPLY (At intake)

1. BACTERIA: Coliferm group not to exceed 5,00C per 100 ml as a monthly average value (either MPN or MF count); not to exceed

this number in more than 20 percent of the samples examined during any month; nor exceed 20,000 per 100 ml in more than 5 percent of such samples;

2. THRESHOLD-ODOR NUMBER: Not to exceed 24 (at 60°C.) as a daily average;

3. CHEMICAL CONSTITUENTS: Not to exceed the following concentrations (or any concentrations) which would be injurious to aquatic life--Arsenic, 0.05 mg/l; Barium, 1.0 mg/l; Cadmium, 0.01 mg/l; Chromium, 0.05 mg/l (hexavalent); Cyanide, 0.02 mg/l; Fluoride, 2.0 mg/l; Lead, 0.05 mg/l; Selenium, 0.01 mg/l; Silver, 0.05 mg/l.

INDUSTRIAL WATER SUPPLY (At intake)

1. Same as general recommendations above (1-4 and 1-7).

AQUATIC LIFE (Warm water, except immediately adjacent to outfalls)

1. DISSOLVED OXYGEN: Not less than 5.0 mg/l during at least 16 hours of any 24-hour period, nor less than 3.0 mg/l at any time. (For cold water environments: 59°-68° F; 7.0 mg/l, nominal);

2. pH: Preferred range between 6.5

and 8.5.

3. BACTERIA: Shall not exceed such levels as will permit natural populations and functioning of indigenous aquatic species and safe limited human contact.

RECREATION (Including direct contact, such as swimming.)

1. BACTERIA: Coliform group not to exceed 1,000 per 100 ml as a monthly average (either MPN or MF count); not to exceed this number in more than 20 percent of the samples examined during any month; nor exceed 2,400 per 100 ml (MPN or MF count) on any day.

In addition to technical considerations, our organization suggests several additional policies, and that among these should be:

a) A system of penalties of sufficient substance which will result in the discontinuation of any practices in violation of any established water standards;

b) An adequate monitoring system administered by appropriate governmental agencies to assure conformity with established standards;

c) Adequate research programs leading to accelerated achievement of standards established, and improvements thereon; advanced waste treatment; in-plant water reuse; and better evaluation and control of discharged materials, as well as improved methods of qualitative and quantitative measurement.

The Indiana Division of the Izaak Walton League offers its continuing cooperation and assistance in moving a sound standards program forward, and in the development of follow-on efforts.

We wish to reserve the privilege of expanding on the commentary above, and of providing oral testimony when hearings are scheduled. Thank you again for inviting our comments.

Sincerely yours,

Wayne C. Stapf, Secretary
Indiana Division, IWLA, Inc., and
Chairman Water Quality Subcommittee

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MR. STEIN: Are there any questions

or comments?

MR. HOLMER: I have a question.

MR. STEIN: Yes, Mr. Holmer.

MR. HOLMER: Are the standards which have been so described this afternoon those which were adopted by Indiana and approved by the Secretary of the Interior?

MR. STEIN: Who are you questioning?

MR. HOLMER: Well, I am asking the gentleman from the Izaak Walton League.

Are these the same standards that were approved by the Secretary of the Interior last July that you are seeking to have changed?

MR. MINNEY: No, I--well, I don't know whether we--which ones are you talking about, now? I want to be sure I am right.

MR. HOLMER: Well, you were raising questions about temperature, for example, as just one item, and if these criteria were submitted by the State Board to the Secretary of the Interior, I assume they are the same ones which are now in effect as Federal standards as a result of approval by the Secretary of the Interior. Is this the situation?

MR. MINNEY: I am not sure that I understand your question.

Maybe Mr. Poole can answer the question.

MR. HOLMER: Mr. Poole or Mr. Mitchell can, I think.

MR. MINNEY: Mr. Poole?

MR. POOLE: I assumed from listening you were talking about the same standards, namely the ones that we adopted first and submitted and were subsequently approved by Interior.

MR. MINNEY: Yes. Yes, those are the ones, yes, sir, that is right.

MR. KLASSEN: Could I ask a question along that point?

MR. STEIN: Yes.

MR. KLASSEN: Does the Izaak Walton League in Indiana approve the water quality criteria that the Secretary approved? Are you for this or against it?

MR. MINNEY: We will approve a program that makes the central waters of Lake Michigan just as safe for body contact as the shoreline.

MR. KLASSEN: You didn't answer my question.

MR. MINNEY: I don't understand the question.

MR. KLASSEN: You didn't answer my question. You raised a lot of objections to temperatures and a number of other things. I assume that you are acquainted with the present standards that have been approved by Secretary Udall for the State of Indiana. Do you endorse those or do you think they ought to be changed?

MR. MINNEY: Think they ought to be changed.

MR. KLASSEN: Well, then, I don't quite understand your last statement, and I agree with you, but that Secretary Udall, "God bless him, he is the greatest conservationist," he approved this, yet you--

MR. MINNEY: This is my opinion. I said that is my opinion, not the opinion of the Izaak Walton League. I said that is my opinion, if you will read the record.

MR. KLASSEN: Oh, I see. The Izaak Walton League objects to these standards, but you think they are all right?

MR. MINNEY: No, I don't. But I think

Secretary Udall has done a job as a man, just the same. That is my personal opinion.

MR. KLASSEN: Even though he approved standards that you don't approve of?

MR. MINNEY: Not of that especially. I don't approve of everything President Johnson does either, but he is my President and I voted for him.

Does that answer your question?

MR. KLASSEN: No.

(Laughter and applause.)

MR. MINNEY: I didn't think it would.

(Laughter.)

MR. STEIN: Any further comment or questions? Mr. Poole.

MR. POOLE: Next and last I want to introduce the most patient lady in the State of Indiana. She has been sitting here since last Wednesday, Mrs. Florence Murray of Michiana Shores, and also a member of the Indiana League of Women Voters.

STATEMENT OF MRS. FLORENCE MURRAY

MICHIANA SHORES

FLORENCE MURRAY

INDIANA LEAGUE OF WOMEN VOTERS

MRS. MURRAY: Thank you. Chairman Stein, ladies and gentlemen, fellow colleagues from Indiana.

It is always comforting to place the blame for any problem, and particularly the problem of water pollution, on the doorstep of someone other than oneself. We read with dismay the charges against the U.S. Army Corps of Engineers who dump the sludge they dredge from rivers into our lake; of huge industries who use tons of clean water daily and return filthy water instead; of cities who open overloaded storm sewers and permit raw sewage to flow directly into the lake; of the vast amount of fertilizers from farms that pollute our water; but I have yet to read the first article with headlines screaming: "HOUSEWIVES INDICTED IN WATER POLLUTION."

I am here to accuse the innocent--innocent of the knowledge but not innocent of the crime--the housewife who accidentally pollutes our water. As a child I can still remember the ring around the dishpan because we used soap to wash dishes. The day detergents replaced soap in the housewife's dishpan, and in her washing machine, and in her scrubpail, we eliminated the ring around the sink and contributed to the ring around the lake. Because detergents are not biodegradable, one can hardly pass a drainage ditch, a stream or a river where bubbles of foam do not testify that the detergent has not been dissolved and is foaming away adding nutrients excessively to our fresh water.

Now, if these nutrients were nourishing our lakes to produce an acceptable product like a fisherman's dream of abundant trout, we would not be here today. But the alewife propelled us, and the detergents have enriched the alewife and the "seaweed." There has been an unintentional assist, you see, by the housewife to the alewife. Increased population means increased use of cleaning products and therefore an increase in water pollution because grocers' shelves are lined with detergents and offer no biodegradable product for Madam Housewife's selection.

FLORENCE MURRAY

If a solution is not found to eliminate the bubbles of foaming detergent, the last line in America, the Beautiful won't read, "From sea to shining sea," but "From bubble to shining bubble.

With so many experts attending this conference, I feel confident that this plea for detergent reform will result in the elimination of water pollution from this source.

Our experience, the stenchy summer of '67 on the beach of Lake Michigan, not only involved water pollution but air pollution as well with a nauseating, revolting wretched odor that Secretary Udall himself described at a press conference as a "tough, miserable problem." Since we cannot legislate air pollution controls over a lake that is unwittingly polluting the air, we must eliminate water pollution.

The purpose of this statement is to present the plea of people just like me, without affiliation or position or influence, who want to know what the "little I" can do to help the "big you." Thank you.

(Applause.)

MR. STEIN: Thank you, Mrs. Murray.

FEDERAL PRESENTATION (CONTINUED)

I believe Mr. Poston may have one short statement from a participant who has been waiting here three days.

FEDERAL PRESENTATION (CONTINUED)

MR. POSTON: Mr. Donald Marshall, Regional Program Chief, Water Supply and Sea Resources Program of the Public Health Service, Department of Health, Education and Welfare, is here. He has been very patient.

MR. STEIN: I know.

How long are you going to be, Don?

MR. MARSHALL: Oh, less than 10 minutes, maybe.

STATEMENT OF DONALD W. MARSHALL
REGIONAL PROGRAM CHIEF
WATER SUPPLY AND SEA RESOURCES PROGRAM
PUBLIC HEALTH SERVICE
DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

MR. MARSHALL: Mr. Chairman, Conferees, ladies and gentlemen.

DONALD W. MARSHALL

A brief message from the Secretary and from our Surgeon General, also Jerry Svore of the Center and Dr. Farney of the Regional Office, who are not able to attend the conference and I am filling in for them.

The Department of Health, Education, and Welfare Region V serves five states, including Illinois, Indiana, Michigan, Ohio, and Wisconsin. As Regional Program Chief of the Water Supply Program of the Public Health Service, I represent the Department of Health, Education, and Welfare, and its regional responsibilities and interests in domestic water supplies and the public health aspects of water pollution control and water resources development. These responsibilities are further served in my capacity as Commissioner representing the Department on the recently created Great Lakes Basin Commission.

The Public Health Service is the principal Federal agency concerned with protection of the public health. The discharge of pollutants and disease-laden waste waters to a body of water such as Lake Michigan and its watershed must inevitably have an adverse effect on the health of people living in the watershed and utilizing the water for domestic supply, commercial and sports fishing, recreation and other purposes. The health threat associated with water is of three types--chemical, biological and radiological.

This statement deals with the health aspects of water pollution control on the Lake Michigan. It is made under the provisions of the Federal Water Pollution Control Act 1965 Amendments and the operational and procedural Agreement of September 3, 1965, between the Department of Health, Education, and Welfare and the Department of the Interior. Subjects of vital public health concern regarding which the Federal Water Pollution Control Administration have agreed to consult with the Public Health Service are drinking water supply, contact with water in recreation and work, contamination of food sources, and the breeding of insect vectors.

The Public Health Service has long been concerned about the quality of water in Lake Michigan. It was on the basis of field investigations and reports prepared by the Division of Water Supply and Pollution Control, Public Health Service, and in accordance with Section 8 of the Federal Water Pollution Control Act (33 U.S.C. 466 et. Seq.) that Secretary A. J. Celebreeze of the Department of Health, Education, and Welfare, on December 15, 1964, called a conference in the matter of pollution of the interstate waters of the Grand Calumet River, Little Calumet River, Calumet River, Lower Lake Michigan, Wolf Lake and their tributaries (Ill.-Ind.) The findings of this conference definitely established the fact that the interstate waters of the previously mentioned streams and lakes were indeed being polluted by untreated and/or inadequately treated municipal and industrial wastes being discharged to these waters, and that these wastes from one State were believed to endanger the health and welfare of persons in another State.

At the request of the U. S. Department of Justice, the Public Health Service conducted extensive water quality studies in Lake Michigan and provided the services of expert witnesses to interpret and explain their findings before Special Master Albert Maris of the U. S. Supreme Court in the recent reopening of the case of Wisconsin vs. Illinois, the Lake Michigan Diversion Case. In his report[1] of December 8, 1966, to the Supreme Court, Judge Maris summarized these findings and their effect on the quality and use of the waters of Lake Michigan. Among the more serious effects of pollution are: (1) the rapidly increasing quantities of algae produced by nutrients in waste discharges. These minute aquatic forms reduce water treatment plant capacities by clogging intake screens and filters, produce tastes and odors in the finished water, and interfere with recreation by forming long windrows of odorous, decaying organic masses on bathing beaches (2) the discharge of phenols and other taste-producing organics which require treatment processes not normally utilized to produce a palatable water (3) the discharge of waste waters to the lake containing pathogenic microorganisms and viral agents. Although normal treatment processes are capable of removing or destroying such organisms, their presence constitutes a potential hazard because of the ever-present possibility of human or mechanical failure. Such discharges do constitute a hazard to those using bathing beaches or having chance contact with the lake waters. Only by frequent monitoring of the bacteriological quality of bathing beach waters can their safe use be assured.

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[1] Report of Albert B. Maris, Special Master, December 8, 1966, in the Supreme Court of the United States.

For many years, the Public Health Service has promulgated drinking water standards for water supplies used on interstate carriers and has been responsible for the certification of such water supplies. These standards have been adopted or are used as the guidelines for drinking water quality in all 50 States. The Public Health Service also has served as consultant and technical assistant to State and local health departments in their programs of safeguarding the quality of municipal-domestic water supplies. Lake Michigan and its tributaries are utilized as a raw water source for domestic water supplies serving over 6.8 million persons.

These waters are also heavily used for industrial water supplies and water-borne commerce. Many of the lake and sea-going vessels take on water from Lake Michigan for use as a potable water supply. Public Health Service regulations allow high quality waters, such as those generally found in the Great Lakes, to be used for drinking and culinary purposes with only disinfection treatment. Recent studies (Report on Vessel Watering on the Great Lakes, dated December 30, 1966) of pollution of Great Lakes waters have revealed contamination in certain areas which exceed recognized limits for such treatment. Such contaminated water may pose a hazard to health. In a recent Notice to Mariners, it was recommended that: confined waters such as Green Bay, water within five miles of shore, and water within twenty miles of metropolitan areas not be taken aboard for use as potable water if it is treated by disinfection only, such as chlorination.

Lake Michigan is also heavily used for recreational activities such as swimming, boating, water skiing, and fishing. Protection of water quality for these uses is a very important aspect of this conference. We are vitally interested in this feature of the conference and the progress of effective remedial programs.

In fulfilling our responsibilities regarding the health aspects of water pollution control, the Public Health Service has developed health guidelines for water resources development including water quality for domestic and food processing use, recreational development, and vector control. The conclusions and recommendations of the Conferees of the previous conference pertaining to Lower Lake Michigan and the Calumet Area included the recommendation to establish a technical committee for the purpose of evaluating water quality criteria and make recommendations pertinent to these waters. In their "Report of Water Quality Criteria, Calumet Area and Lower Lake Michigan - January 1966," this Committee submitted raw water quality criteria for Open Water, Inner Harbor Basins and Shore Water as well as for the tributaries to the lake in this area. Constituents considered by the Committee included bacteriological, chemical, physical, and radiological quality limits in the recommended criteria. The recommendations of the Committee appear satisfactory for the protection of these most important raw water sources and compare favorably to the Public Health Service guidelines.

The States of Wisconsin, Illinois, Indiana, and Michigan, have recently adopted water quality criteria for interstate streams including Lake Michigan. These water quality criteria also include bacteriological, chemical, physical, and radiological limits similar to those of the PHS Drinking Water Standards - 1962.

Criteria alone cannot solve the problems of pollution. Implementation, action, remedial measures must be initiated and carried out. The Department and the Public Health Service urge that corrective measures with the best of our technical know-how be taken to maintain and preserve the water quality of Lake Michigan, a most important source of water, for domestic and industrial uses, recreation and other water-related activities.

I am pleased to represent the Department of Health, Education, and Welfare at this meeting.

We in the Public Health Service are ready to do whatever we can to cooperate and assist in the job of safeguarding and improving the quality of Lake Michigan water which is an important raw water source for a large percentage of the persons in the Lake Michigan area. The work and accomplishments of the Conferees are commendable and we are pleased to join you in this undertaking.

Thank you.

Mr. Chairman, I have a copy of the notice to the mariners that was written by Jerry Svore, our Director of the Center. I also have a copy of the report on which this notice was based. I have preliminary drafts of three of the guidelines for health aspects of water pollution. I want you to recognize they are preliminary in nature and they have been submitted to our headquarters for approval, but they can be introduced for the record.

MR. STEIN: We would be delighted to have those, Mr. Marshall. And give Jerry my regards.

(Which said documents are as follows:)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

National Center for
Urban and Industrial Health Refer to:

November 3, 1967

NOTICE TO MARINERS

Gentlemen:

Public Health Service regulations allow high quality waters, such as those generally found in the Great Lakes, to be used for drinking and culinary purposes with only disinfection treatment. Studies of pollution of Great Lakes waters have revealed contamination in certain areas which exceed recognized limits for such treatment. Such contaminated water may pose a hazard to health.

We wish to advise you of this and request that water not be taken from these areas for use as potable water if it is treated by disinfection only, such as chlorination.

These areas are:

a. Lake Erie west of Pelee Point;

b. Lake Erie east of the Pennsylvania-New York State boundary;

c. Confined waters such as Green Bay and Saginaw Bay;

d. Water within five miles of shore;

e. Water within 20 miles of metropolitan areas.

It is recognized that water of quality acceptable for use as drinking water with disinfection only can generally be found in portions of the listed areas. However, because of the hazard which may exist and with the wide choice of locations in the Great Lakes where water is consistently of acceptable quality, there should be no need to take water from the designated areas.

Information concerning onboard treatment of water and the location of approved shore watering points at Great Lakes ports can be obtained from our Regional Offices at 433 West Van Buren Street, Chicago, or 42 Broadway, New York. Information will also be available during the annual inspections of interstate carrier vessels.

Sincerely yours,

(Signed) Jerome H. Svore

Jerome H. Svore
Director

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VESSEL WATERING ON THE GREAT LAKES

Henning Eklund
Chief, Interstate Carrier Activities
Region V, Chicago, Illinois
December 30, 1966

Summary

The waters of the Great Lakes are generally satisfactory as a source of water for vessels with chlorination as the only treatment. There are areas, however, where coliform densities are higher than permissible for chlorination only. Areas where watering should not be permitted are listed.

Introduction

The Interstate Quarantine Regulations(1) state that "The treatment of water aboard conveyances shall be approved by the Surgeon General if the apparatus used is of such design and is so operated as to be capable of producing and in fact down produce potable water.... Overboard water treated on vessels shall be from areas relatively free of contamination and pollution."

The waters of the Great Lakes have been considered Group II waters which require treatment only by simple chlorination or its equivalent. The Manual of Recommended Water-Sanitation Practice(2) defines Group II waters as "....both underground and surface waters subject to a low degree of contamination, and meeting the requirements of the Public Health Service Drinking Water Standards(3) in all respects except as to coliform bacterial content, which should average not more than 50 per 100 ml in any month."

On October 10, 1966 Mr. C. T. Armstrong, President of Great Lakes Seamen Local 5000 of the United Steelworkers of America, filed a complaint with the Surgeon General(4). He questioned the practice of vessels that take water from Lake Erie and treat it by chlorination only. He considered this practice to be insanitary, and detrimental to the seamen who use this water. He requested that immediate action be taken to stop this practice.

On October 25 I talked to Mr. Armstrong

and learned that most of the vessels that he was concerned about were in the coal trade in western Lake Erie, and that the specific complaint came from the Crispin Oglebay of the Oglebay Norton fleet.

Field Study

Eighteen vessels were boarded to investigate the source and condition of the drinking water aboard. The vessels were selected to represent vessels in the coal trade on Lake Erie and vessels of the Oglebay Norton fleet. A few other vessels were boarded also for comparison. The Captain and Chief Engineer or their representatives were interviewed to determine the source of the drinking water aboard, if they ever watered in Lake Erie, and if so, where. Samples of water were taken from the galley for determination of coliform bacteria, threshold odor, color, and turbidity. These samples were analyzed by the water supply laboratories of Detroit, Toledo, and Chicago. While these samples were being taken, the concentration of residual chlorine in the drinking water was determined. Two samples of drinking water that had been taken aboard in Lake Erie were sent to SEC in Cincinnati for chemical analysis. The Ashland had taken on water three miles off Long Point, and the Crispin Oglebay had taken on water near Middle Sister Island.

The Public Health Service Hospital in Detroit and the Outpatient Clinic in Chicago were contacted to determine the occurrence of gastroenteritis among merchant seamen.

In addition to the above, information on the occurrence of coliform bacteria in the open waters of the Great Lakes, except Lake Superior, was obtained from the Great Lakes Project of the Water Pollution Control Administration.

Results

Interviews with the officers of the vessels about source of water aboard yielded the following information. Nine had taken water in the Upper Lakes (Lakes Superior, Huron, and Michigan), five had taken water from approved shore watering points, and four had taken water directly from Lake Erie. When questioned about the frequency of watering in Lake Erie, four reported that they watered regularly in Lake Erie, two watered there occasionally, and eleven reported either that they never watered in Lake Erie or that they had not watered there this year. One vessel master was not asked this question. All masters reported that they disinfect lake water before use, as required by regulation. Of the six vessels that reported taking Lake Erie water regularly or occasionally, four said that they watered off Long Point in eastern Lake Erie, near the deepest part of the lake. One said he watered about 30 miles offshore, but did not specify where. One, the Crispin Oglebay, to which Mr. Armstrong referred, regularly watered in western Lake Erie. The master said he sometimes watered south of Detroit Light. On this particular trip he had watered near Middle Sister Island enroute from Cleveland to Toledo. Other masters who do not water in Lake Erie were asked where they would water in Lake Erie if it were necessary to do so. All replied that they would water off Long Point. The preceding information is summarized in Table I.

The Public Health Service Hospital in

Detroit and the Outpatient Clinic in Chicago were contacted to determine if any effects on seamen had been noted as a result of drinking lake water. It was learned that the medical experience of seamen treated at the hospital gives no conclusive evidence of epidemic or multiple attacks of gastroenteritis from one vessel or vessels of one company sailing the Great Lakes. The Outpatient Clinic reported that the observed incidence of gastroenteritis among merchant seamen is less than that in the general population.

As previously stated, samples of drinking water were taken from the vessels to determine if they met the 1962 Drinking Water Standards. The analytical results are shown in Tables II and III. All 18 samples were negative for coliform bacteria. The data in Table II also show that color, odor, and turbidity were acceptable except for turbidity aboard the Ben E. Tate. Since this water had been taken from a shore supply, it is likely that the high turbidity resulted from sediment in the tank.

Table III shows the results of chemical

analysis of water from the Ashland and the Crispin Oglebay. The Ashland had taken water from Lake Erie three miles off Long Point, and the Crispin Oglebay had taken water from Lake Erie near Middle Sister Island. Since no analyses were made for chloride, carbon chloroform extract, sulfate, and total dissolved solids, appropriate values were taken from the Buffalo station of the Water Pollution Surveillance System(5). The value for nitrate was obtained from the City of Toledo(6). It is seen that all values are within the Drinking Water Standards.

It is concluded from the data presented that water taken from Lake Erie and chlorinated met the 1962 Drinking Water Standards in every respect. It is also concluded that the unchlorinated surface water also met the Drinking Water Standards in every respect except as to bacterial content. It was for the purpose of determining where Group II waters, those with an average coliform bacterial content of not more than 50 per 100 ml, exist in the Great Lakes that the records of the Federal Water Pollution Control Administration were consulted.

Lake Erie

Data from studies by the Detroit River-Lake Erie Project(7) have shown that the Michigan waters of Lake Erie cannot be considered as Group II waters. The geometric mean of coliform determinations in about one-half of this area is greater than 100 per 100 ml. The geometric mean values below the Detroit River Light lie between 2400 and 5000 per 100 ml. When it is remembered that the geometric mean is usually a much smaller number than the arithmetic mean, there is considerable doubt that any part of Michigan waters meets the criterion of 50 per 100 ml arithmetic average. Such a conclusion is supported by the fact that the sampling station showing the lowest maximum coliform concentration showed 140 per 100 ml. The next lowest maximum was 100 per 100 ml. It is also concluded that the immediately adjacent waters in Ohio and Canada do not meet the criterion.

Records of the Lake Erie Program Office, FWPCA, indicate that the open waters of Lake Erie meet the coliform criterion for Group II waters with three exceptions. One area is Michigan waters previously discussed. Another area is immediately west of Pelee Point and north of Pelee Island on shipping lanes where consistently high coliform counts are found. Other isolated high values are found in the area west of Pelee Point. The influence of the Detroit River and the vagaries of lake currents are such that it appears inadvisable to take drinking water from any part of Lake Erie west of Pelee Point and treat it with chlorination only.

The third area in Lake Erie that is of questionable quality is east of the Pennslyvania-New York State boundary, where median values ranging between 10 and 100 coliform bacteria per 100 ml have been found. In contrast to western Lake Erie, there is no immediately apparent reason why high coliform counts should be found here. On the basis of the data, however, it would appear inadvisable for vessels to water in this portion of Lake Erie.

Except for these areas, the main body of Lake Erie, including the area off Long Point, appears to meet the criterion of Group II waters, and chlorination only should be acceptable treatment. Median coliform values are consistently less than 1 per 100 ml in half of this region, and less than 10 per 100 ml in the other half of the region.

This conclusion has been supported by documents by the Federal Water Pollution Control Administration. In March 1965, it was stated: "Much of the American shoreline of Lake Erie out one to two miles is a polluted zone. Coliform counts decrease rapidly as one proceeds out into the lake so that when one gets beyond the two-mile zone counts are frequently near zero."(8) Again in June 1965 it was stated about the Cleveland area: "Studies show that the most seriously polluted zone is an area extending to only about one-half mile into the lake under normal conditions. From the one-half mile zone on out to about three to four miles the transition in quality is gradual until it reaches the background of the lake waters. The Cleveland water intakes are well beyond the polluted zone."(9) The FWPCA Enforcement Conference Report on Lake Erie(10) did not state that the open waters of

Lake Erie exhibited high numbers of coliform bacteria.

Lake Ontario

Records of the Lake Ontario Program Office show high coliform concentrations near metropolitan centers. If, however, one excludes waters within a 20-mile radius of the mouth of the Niagara River, within 20 miles of Toronto and Hamilton in Ontario, and within 20 miles of Rochester and Oswego in New York, the remaining open waters are found to meet the coliform requirements of Group II waters.

Lake Huron

Records of the Lake Huron Program Office show that all open waters in Lake Huron, except near the mouth of the Saginaw River, meet the coliform requirements of Group II waters.

Lake Michigan

Data of the Great Lakes-Illinois River Basins Project(11) indicate that the waters of Green Bay, in places, do not meet the coliform requirements of Group II waters. The open waters of Lake Michigan 20 miles away from metropolitan centers do, however, meet the requirements for Group II waters.

Lake Superior

There are as yet no coliform data available on the open waters of Lake Superior. Records of the Water Pollution Surveillance System (12) show an average coliform density of 35 per 100 ml at the Duluth water supply intake and 22 at Sault Ste. Marie. It is therefore inferred that the open waters of Lake Superior meet the requirements for Group II waters.

Proposed Policy Statement

The information heretofore presented in this report shows that the bulk of the water in the Great Lakes meets the requirements for Group II waters, for which disinfection is the only required treatment. There are certain areas, however, from which drinking water should not be taken. It is recognized that acceptable water may be found in some of these areas, but the areas of acceptable water are so large that there is no reason to take water in the questionable areas. In order to keep instructions to Ships' Masters simple, five rules for open lake watering are proposed. Water covered by these rules should not be used for drinking water supply if the only treatment provided is chlorination. The restricted waters are as follows:

a. Lake Erie west of Pelee Point.

b. Lake Erie east of the Pennsylvania-New York State boundary.

c. Confined waters such as Saginaw Bay and Green Bay.

d. Water within 5 miles of shore.

e. Water within 20 miles of major metropolitan areas and tributary streams.

DONALD W. MARSHALL

References

1. Interstate Quarantine Regulations, Para. 72.103
2. DHEW, Public Health Service, "Manual of recommended Water-Sanitation Practice," 1946
3. Public Health Service Drinking Water Standards, Publication No. 956, 1962
4. Letter dated October 10, 1966 from Mr. C. T. Armstrong, President, Local 5000, United Steelworkers of America, Cleveland, Ohio, to the Surgeon General
5. Water Pollution Surveillance System, FWPCA, October 1, 1962-September 30, 1963
6. The 1965 Annual Report, Division of Water, Toledo, Ohio
7. R. D. Vaughan and G. L. Harlow, "Report on Pollution of the Detroit River, Michigan Waters of Lake Erie, and their Tributaries," FWPCA, April 1965.
8. C. W. Northington, "Lake Erie - Sick

Dying, or Well," FWPCA, March 1965

9. C. W. Northington, "Water Pollution Aspects of the Lake Erie Shoreline," FWPCA, June 1965

10. Report on Pollution of Lake Erie and its Tributaries, FWPCA, July 1965

11. "A Comprehensive Water Pollution Control Program, Lake Michigan Basin, Green Bay Area," FWPCA, June 1966

12. Water Pollution Surveillance System, FWPCA, October 1, 1963-September 30, 1964.

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HEALTH GUIDELINES FOR WATER RESOURCE AND RELATED LAND USE MANAGEMENT

PART 1: WATER QUALITY FOR DOMESTIC AND FOOD PROCESSING USES

PRELIMINARY DRAFT
USPHS, DHEW
November 1967

INTRODUCTION

Health guidelines for water resource management are being prepared for the guidance of Federal and other agencies concerned with the development of the Nation's water resources and related land uses. The guidelines entitled "Part 1: Water Quality for Domestic and Food Processing Uses" are the initial issuance of the health guidelines. Future guidelines will be prepared to cover all other health aspects of water and related land uses.

Part 1 also fulfills a portion of DHEW's commitment to the Federal Water Pollution Control Administration, Department of the Interior, pursuant to section 5 (a) of the DHEW-Interior Interdepartmental Agreement "Health Aspects of Water Pollution Control," dated September 2, 1966, which states as follows:

> "5. Under the terms of this Interdepartmental Agreement the Department of Health, Education, and Welfare will provide advice to the Department of the Interior as follows:
>
> (a) Recommendations on criteria for water quality standard setting

> based on health aspects of intended water use for drinkinter water supplies, shellfish and other marine food production, bathing, and other water contact activities. Recommendations will be provided and modified as new supporting data are developed."

In considering these guidelines it must be noted that they are based upon available information and are subject to review and modification as new information becomes available. It should also be recognized that guideline contaminant levels constitute only one of several health protection tools. Before waters in any one geographic location can be considered safe for any of the various human uses at least two additional facets should be considered:

1. Sanitary Survey: As examples, low contaminant levels can mask an intermittent but potentially hazardous pollution source; or special geologic features can provide a short-circuit

pathway for quick pollution travel from source to wells used for community purposes. A sanitary survey made by qualified public health authorities is needed to reveal these and other hazardous possibilities in the health consideration of specific waters.

2. Epidemiology: As a third facet in the trilogy of health checks, epidemiology will indicate whether identifiable disease occurrences have been associated with specific waters. Initially such an assessment will depend upon existing records. Plans should be made however for the systematic recording of pertinent data and the epidemiological assessment should be of a continuing or periodic nature routinely done by health authorities.

For waters to be considered safe from a health standpoint, a satisfactory finding must be made on water quality levels; and the sanitary survey and epidemiology must reveal no serious hazards or disease occurrence. On the other hand, negative findings on any one of the three aspects would raise serious health questions with regard to the use of specific waters for human purposes.

WATER QUALITY FOR DOMESTIC AND FOOD PROCESSING USES

To be considered safe from a health standpoint, the subject waters should meet indicated cirteria for quality, and be judged safe on the basis of a sanitary survey and an epidemiological assessment. Water for food processing should meet the same requirements as water for domestic use; however, where food processing may concentrate contaminants or otherwise change the nature of contaminants, additional and stricter requirements may be needed as determined by health authorities.

A. Public Health Service Drinking Water Standards - 1962

As part of its responsibilities under the Public Health Service Act, the Public Health

Service has developed over the years and kept up to date the subject standards for potable water used by carriers subject to the Federal Quarantine Regulations. These standards constitute the essential baseline for health criteria with respect to water quality for domestic and food processing uses. They also serve as an important reference point for health criteria with respect to water quality for other uses.

B. Quality of Untreated Raw Ground Water for Domestic and Food Processing Uses

a) Bacteriological: Should meet Public Health Service Drinking Water Standards

b) Physical: Should meet Public Health Service Drinking Water Standards

c) Chemical: Chemical present should not exceed the following concentrations:

Substance	Concentration (mg/l)
Arsenic (As)	0.01
Barium (Ba)	1.0
Boron (B)	1.0

Substance	Concentration (mg/l)
Cadmium (Cd)	0.01
Carbon Chloroform Extract (CCE)	0.2
Chloride (Cl)	250
Chromium (Hexavalent, Cr^{+6})	0.05
Copper	1.0
Cyanide (CN)	.01
Detergents (Methylene Blue Active Substances)	0.5
Fluoride (F)	
50.0-58.3*°F	1.8
58.4-70.6*°F	1.5
70.7-90.5*°F	1.2
Iron (Fe)	0.3
Lead (Pb)	0.05
Manganese (Mn)	0.05
Nitrogen (in nitrate or nitrite form)	10.0
Phenols	0.001
Selenium (Se)	0.01
Silver (Ag)	0.05
Sulfate (SO_4)	250
Total Dissolved Solids	500
Uranyl ion (UO_2^{++})	5.0
Zinc (Zn)	5.0

Substances not included in the above table which may have deleterious physiological effect or which may be excessively corrosive to the water supply system should not be permitted in the raw water supply.

d) Radioactivity: Should meet Public Health Service Drinking Water Standards

e) Pesticides: Should not exceed the following limits:

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* Annual average of maximum daily air temperatures.

Pesticide	Maximum Permissible Concentration *mg/l
1. Endrin	0.001
2. Aldrin	0.017
3. Dieldrin	0.017
4. Lindane	0.056
5. Toxaphene	0.005
6. Heptachlor	0.018
7. Heptachlor Epoxide	0.018
8. DDT	0.042
9. Chlordane	0.003
10. Methoxychlor	0.035
11. Total Organophosphorous and Carbamate Compounds (expressed in terms of Parathion Equivalent Cholinesterase inhibitions)	0.1
12. 2,4,5-TP	Individual limits = 0.1 mg/l. Sum of any combination of chlorinated phenoxy alkyl pesticides - 0.1 mg/l.
13. 2,4,5-T	
14. 2,4-D**	

C. Quality of Raw Water, Treatment by Disinfection Only, For Domestic and Food Processing Uses

a) This water should meet all of the requirements for Physical,

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* For long-term exposure

** Short period limit only--two to three days, no more than once or twice a year.

Chemical, Radioactivity, and Pesticides as shown for untreated raw ground water in Sections B. b, B. c, B. d, and B. e respectively.

b) Bacteriological:

1) Coliform Group: Less than 100/100 ml. as measured by a monthly arithmetic mean.

2) Fecal Coliform: If fecal coliform density is measured, the above total coliform density may be exceeded, but fecal coliform density should not exceel 20/100 ml. as measured by a monthly arithmetic mean.

D. Quality of Raw Water, Treatment by Complete Conventional Means Including Coagulation, Sedimentation, Rapid Sand Filtration, and Disinfection, for Domestic and Food Processing Uses

a) Bacteriological:

1) Total Coliform Density: Less than 20,000/100 ml. as measured

by a monthly geometric mean

or,

2) Fecal Coliform Density:

If fecal coliform density is measured, the above total coliform density may be exceeded but fecal coliform should not exceed 4,000/100 ml. as measured by a monthly geometric mean.

b) Physical: Elements of Color, Odor, and Turbidity contribute significantly to the treatability and potability of the water.

Color. . . . .75 color units (This limit applies only to non-industrial sources; industrial concentrations of color should be handled on a case-by-case basis and should not exceed levels which are treatable by complete conventional means.)

Odor . . . . .5 threshold numbers
Turbidity. . .Variable

(Factors of nature, size, and electrical charge for the different particles causing turbidity require a variable limit. Turbidity should remain within a range which is readily treatable by complete conventional means; it should not overload the water treatment works; and it should not change rapidly either in nature or in concentration where such rapid shifts would upset normal treatment operations.)

c) Chemical:

  1) Since complete conventional treatment generally produces little reduction in chemical constituents, raw water should meet the limits given in section B. c of this Guideline.

d) Radioactivity: Should meet Public Health Service Drinking Water Standards.

e) Pesticides: Should meet requirements for Pesticides as shown for untreated raw ground water in section B. e.

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HEALTH GUIDELINES FOR WATER RESOURCE AND RELATED LAND USE MANAGEMENT

PART II: RECREATION AREA DEVELOPMENT

PRELIMINARY DRAFT
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HEALTH GUIDELINES FOR WATER RESOURCE AND RELATED LAND USE MANAGEMENT

PART II: RECREATION AREA DEVELOPMENT

The conservation, development, and wise use of outdoor recreational resources are of great importance in satisfying the social and health goals of our population. Expanding leisure time, growing interest in outdoor recreation, increased mobility of people, and a rising standard of living make it possible for more people to seek and utilize recreation areas.

The term "recreation area" refers to land and water areas dedicated to the enjoyment of the public. These developments generally involve facilities operated by a public agency, concessionaire, voluntary or private groups, or individuals and include parks, campgrounds, shelters, picnic areas, travel trailer parking areas, resorts, motels, hotels, cabin camps, organizational camps, marinas, and other facilities relating to a variety of activities--swimming, fishing, hunting, boating, sailing, hiking, picnicking, camping, touring, and sightseeing.

In many instances the planning, provision, and maintenance of facilities in recreation areas have not kept pace with the rapidly increasing visitor load. As a result optimum use of such areas is not possible and deterioration of overtaxed facilities is frequently encountered. Where facilities such as water supply, sewage disposal, and refuse handling are inadequate or lacking, the visitors will fend for themsevles, often creating conditions which are aesthetically offensive as well as serious environmental health hazards for themselves and neighboring community residents or visitors. Available recreation facilities will need to be at least tripled by the year 2000 to meet the needs of the Nation's exploding population and leisure time.[1] Estimates are that adequate environmental health safeguards comprise approximately 30 percent of development costs of new recreation areas. Since these safeguards represent such an appreciable investment care should be taken in properly planning, constructing, and maintaining adequate facilities.

Experience has demonstrated that when a large number of persons gather in one place health problems are accentuated. The increasing number of visitors to recreation areas has created a need for planning and constructing adequate health-related facilities and for education of the public to observe good sanitary and personal hygiene practices under primitive conditions. Continuing research and studies to develop improved standards and solutions to environmental health problems peculiar to recreation areas and activities need public support.

In recognition of the stated relationships between recreation and public health interests and in order to obtain maximum health protection of the population from environmental health hazards in recreation areas, all Federal, State, and local public or private agencies, groups, or individuals having responsibility for the planning, development, design, operation, or maintenance of recreation areas are urged to apply high standards of public health in the administration of and supervision of their programs. A high level of performance in this regard can be facilitated by maintaining close cooperation and consultation with concerned health authorities and can be realized by following applicable environmental health standards and criteria.

There are many important considerations which must be included in the overall planning, development, and operation of recreation areas to insure that proper health protection of individuals visiting or residing in such areas will be provided and maintained. Among the requisities for a safe and healthful environment in such areas are the following:

(1) Site selection based on health and safety considerations as well as convenience, economy, and scenic beauty.

(2) Development of sources, treatment,

and distribution of water supply to meet quality and quantity standards for domestic use.

(3) Proper collection, treatment, and disposal of sewage wastes to prevent pollution hazards.

(4) Proper storage, collection, and disposal of garbage and other refuse.

(5) Design of kitchen, dining, and other facilities to insure that safe handling and serving of food and drink to the public can be accomplished. Certification of sources of food, frozen desserts, and milk and milk products during operation.

(6) Adequate and safe housing, including campsites, cabins, dormitories, and other public use buildings.

(7) Control of insects and rodents.

(8) Elimination of accident hazards and promotion of safety.

(9) Properly designed and operated outdoor bathing areas and swimming pools.

The most effective means to insure consideration of these requisites and to insure assessment of their present and future significance is by active cooperation between health and recreation agencies. The development and review of plans of proposed developments and facilities by qualified public health engineers is essential. A program of periodic surveys and inspection of facilities and their operation in recreation areas should be established by public health and recreation authorities.

As an introduction to the factors of concern to health authorities in the development of recreation areas a brief discussion is presented regarding specific problem areas in the following text. The format and much of the text of this Guideline were taken from Environmental Health Practice in Recreational Areas.[2]

SITE SELECTION

Sites selected for recreation areas

should be well drained, gently sloping, free from topographical or geological hindrances, and accessible to proposed sources of water supply and sewage disposal works. Sites should be free from heavy traffic, air pollution sources, and noise sources. To be most acceptable and efficient, sites should not encroach on the natural, scenic, esthetic, scientific, or historic values of the recreation area. Avoiding locations near swamps and marshes, where insects such as mosquitoes may breed and cause severe annoyance and discomfort, will enable full enjoyment and utilization of the area by the visiting public.

Other considerations of importance are:

(1) Hazard-free entrance to and exit from the recreation area.

(2) Surfaced and looped roadways.

(3) Availability of an entomological survey of the area.

(4) Preclusion of flooding of the recreation area.

(5) Control and removal of undergrowth

in developed places.

(6) Availability of an adequate water supply and sewerage system.

WATERSHED MANAGEMENT

Watershed management involves the supervision, regulation, maintenance, and wise use of the aggregate resources of a drainage basin to provide an optimum yield of water of desirable quality, including the control of erosion, pollution, and floods. The condition of the soil and the growth it supports have a marked influence on the quality and quantity of water contributed by a watershed. The use of various control measures and management practices in the watershed is essential to conserve water resources and to prevent economic losses to municipal, industrial, and agricultural water supplies, fisheries, and recreation. In carrying out the various functional activities on watershed lands, including grazing of livestock and game, logging, roadbuilding, fire control, sewage disposal, and recreation, it is essential that satisfactory watershed conditions be preserved.

Of particular concern are:

(1) Erosion control both during and following construction.

(2) Controlled cutting of timber in logging areas.

(3) Controlled grazing to prevent overgrazing by livestock and game.

(4) Control of the disposal of domestic and industrial liquid and solid wastes in and adjacent to recreation areas and watercourses.

(5) Control of mining and ore-processing operations to prevent pollution of the recreation waters.

(6) Evaluation of potential health hazards through consideration of the toxicity, persistence, and exposure factors of pesticides to be used.

(7) Prohibition of uncontrolled camping in areas without proper facilities.

WATER SUPPLY

An adequate supply of water under

pressure which meets the source and protection, bacteriological, chemical, physical, and radiological requirements of the Public Health Service Drinking Water Standards[3] or equivalent is essential for the convenience, comfort, safety, and health of visitors and resident staffs at outdoor recreation areas.

Points which should be considered are:

(1) Extension to the recreation area of any State-approved public water supply within a reasonable distance.

(2) Quality and quantity of water supplies available.

(3) Degree of treatment necessary to provide water meeting the USPHS Drinking Water Standards.

(4) Appropriate steps to provide disinfection as well as to prevent chance contamination of hauled water.

(5) Completion of a sanitary survey by a qualified person as part of the collection of initial engineering data on the development of the water supply

source and its capacity.

(6) Design, construction, and supervision of the proposed water facilities to minimize potential vandalism.

(7) Qualified supervision and maintenance of the water treatment equipment.

(8) Protection of the water quality through the design, construction, and maintenance of the distribution system.

SEWAGE DISPOSAL

Safe disposal of human and domestic wastes in recreation areas is necessary for the preservation of the surface and ground waters and the restoration of such waters to the best possible condition consistent with the public health and welfare. Proper sewage disposal prevents damage caused by sewage to the propagation and preservation of fish and wildlife, and is essential to protect the visiting public, employees, and nearby communities from diseases transmitted through sewage.

Some important health-related factors are:

(1) Provision of a properly designed, constructed, and supervised water-carriage sewage-disposal system. (Pit toilets are unsatisfactory.)

(2) Locating outfalls to minimize the potential effects of effluent sewage.

(3) Proximity of septic tanks and subsurface disposal systems to buildings, beaches, camping and picnic areas, and water supply systems.

(4) Properly planned sludge disposal.

PLUMBING

Plumbing includes "the practice, materials, and fixtures used in the installation, maintenance, extension, and alterations of all piping, fixtures, appliances, and appurtenances in connection with any of the following: sanitary drainage or storm drainage facilities, the venting system, and the public or private water supply systems within or adjacent to any building structure, or conveyance; also the practice and materials used in the installation, maintenance, extension, or alteration of stormwater, liquid waste, or sewage, and water supply systems of any premises to their connection with the public sewer system or other acceptable disposal facility."[4]

In planning, the following should be considered:

(1) Provision of at least a minimum number of plumbing fixtures based upon peak visitor day use (see Table 1)

(2) Conformance of materials used and installation to local and State codes and the minimum standards of the National Plumbing Code (as revised).

BUILDING AND HOUSING HYGIENE

Housing of a healthful quality must provide for fulfillment of the physiological needs of man, which include: a thermal environment that not only is conducive to good health but is comfortable and promotes efficiency of living; air that is chemically pure and free from objectionable odors; humidity that is healthful and comfortable; and air movement that will assist in maintaining the desired thermal conditions and air purity and will provide for necessary air changes. Housing should be free of noise that may impair health. Lighting should be quantitatively and qualitatively adequate including both natural and artificial sources.

All buildings and dwelling units should be constructed in accordance with the minimum requirements of the "Proposed Housing Ordinance"[6] prepared by the Committee on the Hygiene of Housing of the American Public Health Association or requirements that are substantially equivalent. The "Basic Principles of Healthful Housing,"[7] prepared by the same committee, is another good reference in the field of housing. Those concerned with the design, operation, and maintenance of public buildings should consult these references

TABLE I[4,5]

Type of building occupancy	Waterclosets		Urinals		Lavatories		Bathtubs or showers		Drinking fountains**	Other Fixtures
	Males	Females	Males	Females	Males	Females	Males	Females		
Swimming pools Based on maximum load. (fixture/bathers)	1/75	1/50	1/75	- - -	1/100	1/100	1/50 minimum of 2	1/50	1 located in swimming pool area	

	WATERCLOSETS			URINALS		LAVATORIES		
	Number of sites	Number of fixtures		Number of sites	Number of fixtures	Number of sites	Number of Fixtures	
		Male	Female				Male	Female
Comfort station for campgrounds	1-20 21-30	1 2	2 3	1-20 21-30	1 2	1-20 21-30	1 2	1 2
	Number of car parking spaces	Number of fixtures		Number of car parking spaces	Number of fixtures	Number of car parking spaces	Number of fixtures	
		Male	Female				Male	Female
Comfort stations for picnic areas	1-40 41-80 81-120	1 2 3	2 4 6	1-40 41-80 81-120	1 2 3	1-40 41-80 81-120	1 2 3	1 2 3

A comfort station with good balance should contain 2 waterclosets, 2 lavatories, and 1 urinal for males; and 2 waterclosets and 2 lavatories for females. A sanistand substituted for 1 watercloset is desired for females. A comfort station should provide facilities for sites within a 300-foot radius.

**Drinking fountains should not be installed in toilet rooms.

for more complete coverage of this subject. Plans and specifications convering housing, dormitories, camps, hotels, restaurants, and similar facilities should be submitted to the appropriate authorities having jurisdiction for review and recommendations. Some of the more important aspects of housing not covered elsewhere in this Guideline are outlined below:

(1) Provision of adequate openable window area for habitable rooms.

(2) Provision of adequate outlets where electric service is available.

(3) Provision of adequate safe heating facilities.

(4) Provision of screens for doors and openable windows during seasons when it is necessary to protect against mosquitoes, flies, and other insects.

(5) Protection of buildings against rodent entry.

(6) Construction of water closet compartment and bathroom floor surfaces of material impervious to water.

(7) Minimum spacing of buildings as defined in Table II.

Table II. Spacing and Location of Buildings[5]

	Feet*
Apartment Buildings	40
Bunkhouses	40
Dormitories	40
Duplex residences	30
Multifamily dwellings	40
Quarters	30
Ranger station	30
Unit for seasonal occupancy	40

MILK AND FOOD SANITATION

Despite the progress which has been achieved in food protection programs, foodborne any other building.

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*Minimum spacing between various housing units and any other building regardless of construction type. All buildings in this group should be so located that the side facing the access road is not less than 25 feet back from the inside line of the sidewalk or road curb where no sidewalk occurs. Each building in this group should have one side, other than the one facing the access road, not less than 60 feet from

illness continues to be a major public health problem. The incidence of such illness can be reduced by the application of the basic principles of food protection. However, to achieve this on a day-to-day basis, better understanding on the part of many food-service employees and employers must be developed, and this in turn will necessitate a maximum of cooperation between public health agencies and the food service industry. The need for ever greater attention to this problem in recreation areas is due to the seasonal operation of many areas and the widely fluctuating visitor load that must be accommodated by food service facilities provided. Seasonal employees who lack adequate training in good food-handling practices introduce additional hazards.

The applicable State and local milk sanitation laws and regulations and the Public Health Service "Grade 'A' Pastuerized Milk Ordinance"[8] should be followed for the dispensing of milk and milk products. The "Food Service Sanitation Manual"[9] including "A Model Food

Service Sanitation Ordinance and Code, 1962 Recommendations of the Public Health Service" is a basic reference in the field of food sanitation. Where ice is produced for public use the "Sanitary Standard for Manufactured Ice - 1964 Recommendations of the Public Health Service"[10] should be applied. A basic reference for the dispensing of foods and beverages is "The Vending of Foods and Beverages"[11] a sanitation ordinance and code recommended by the Public Health Service. When a food service establishment is constructed, properly prepared plans and specifications showing layout, arrangement, and construction materials and the location, size, and type of fixed equipment and facilities should be submitted to the health authority having jurisdiction for approval before work is initiated.

SOLID WASTE DISPOSAL

Public health problems are often associated with improper storage, collection, and disposal of solid waste in recreation areas. Experience has shown that the application of the basic principles of sanitation to solid waste

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handling results in substantial reductions in fly, rodent, and other insect problems.[13] In addition, there are significant relationships between the incidence of certain diseases in humans and animals and improper solid waste disposal.[14,15] Many hazards and nuisances, such as fire, smoke, odors, and unsightliness, are also created by poor solid waste handling practices. The full appreciation of recreation area values by the public is often diminished by the disorder of accumulated solid waste.

Among the principles to be planned for are:

(1) Collection of solid waste in durable, watertight, rust-resistant, nonabsorbent, and easily washable covered containers.

(2) Sufficient solid waste collection plans (number of containers, size of containers, and frequency of collection) to prevent unsightliness and fly and rodent problems.

(3) Disposal of trash and garbage.

a) by sanitary landfill

b) by incineration

c) by garbage grinding
(to sewage system)

d) by feeding cooked garbage
to swine and/or

e) by modified sanitary
landfill

(4) Prohibition of open burning other than camp fires.

THE COMPATIBILITY OF RECREATION AND WATER SUPPLY

The competition among multiple uses of our land and water resources demands assessment of the compatibility of uses such as recreation and domestic water supply. There is no doubt that recreation comprises one of the major uses of water resources, representing major economic and social benefits. Domestic use is also of major benefit and may often be the most exacting use of the water resources. When various uses are not compatible and conflicts exist, compromise is necessary. Where multiple compromises between the two uses should be considered and adopted. The following factors concern these compromises.

(1) Present physical, chemical,

and bacteriological quality of the water resource.

(2) Comparison of the probable degree of contamination of the water resulting from recreational and other uses to water quality guidelines or State or Federal standards for recreational and water supply use.

(3) Degree of toxicological contamination and deterioration of water quality by wasted oils, motor fuels, pesticides, and other chemicals used to maintain and operate recreation facilities and equipment.

(4) Interference with the drinking water use resulting from increased turbidities caused by boating, water-contact sports, and erosion from roads and cleared recreation areas.

(5) Control of taste, odor, and color producing algal growth.

(6) Proposed degree of water treatment for the drinking water use.

(7) Adequacy of the proposed water treatment to handle anticipated pollution loads with a proper safety factor for producing water meeting the PHS Drinking Water Standards.

(8) Provision of a multiple elevation withdrawal tower as the water supply intake to allow the advantage of planned withdrawal of the highest quality of water under varying conditions of water quality in the reservoir.

(9) Designation of a restricted area around the water supply intake in which recreational use is prohibited.

(10) Assurance of a minimum holding time of 30-45 days in the restricted area before transmission to the water treatment plant.

(11) Complete clearance of the restricted area of vegetation, buildings, manure deposits, swamp debris, and

other sources of organic matter.

(12) Monitoring of the water quality on a regular basis.

Only where these factors have been considered in some detail and resolved to the satisfaction of the concerned health authorities can the simultaneous use of reservoirs for water supply and recreation be considered satisfactory.

WATER CONTACT RECREATION
WATER QUALITY

These guidelines include biological, chemical, and physical quality criteria. Final judgment on the acceptability of the use of any water classified under these guidelines should also include consideration of the significance of the findings of a complete sanitary survey and continuous surveillance of possible hazards as well as appropriate safety considerations.

Biological (To be reevaluated for inclusion of sample size and sampling frequency)

The fecal coliform density should not exceed a geometric mean of 200/100 ml with a sampling frequency of 5 samples per month taken during peak recreational use. Not more than 10 percent of the samples fecal coliform densities should exceed 400/100 ml.

Chemical

The water should contain no chemical which could cause toxic reaction if ingested or irritation to the skin or eyes. The water pH should be within the range 6.5-8.3.

Physical

The water color should not exceed 15 standard units and its turbidity should not exceed 30 standard units. Maximum water temperatures should not exceed 85°F (30°C).

SWIMMING POOLS AND OUTDOOR BATHING PLACES

Public health authorities have been concerned with sanitation and safety problems involving swimming and bathing for many years. While the problem of accidents and drownings are the most dramatic statistics relating to swimming, the communicable disease aspects must be given proper attention.

The following factors should be considered:

(1) Design, construction, and operation of proposed swimming pools in accordance with requirements of the health authority having jurisdiction or in accordance with the standards outlined in the "Suggested Ordinance and Regulations Covering Public Swimming Pools"[17] and "Environmental Health Practice in Recreational Areas."[2]

(2) Acceptability to health authorities of the proposed water supply as a potable water source.

(3) Discharge of the swimming pool water through an air gap to the waste water receiver and recharge of the swimming pool through an air gap.

(4) Proper design for "user loading."

(5) Practice of continuous disinfection of pool water.

(6) Routine examination of bacteriological samples taken from outdoor bathing places.

(7) Decisions on the use of natural

bathing areas based upon the results of chemical analyses, bacteriological examinations, and a sanitary survey of the proposed natural bathing area.

(8) Elimination of possible gross animal pollution of the bathing area.

(9) Evaluation of the effects of peak visitor days on water quality and recreational use.

BATHING LOAD FOR OUTDOOR BEACHES

In a swimming pool whose water is derived from a public or other supply of drinking water quality, it may be assumed that the presence of organisms of the coli-aerogenes group indicates pollution by fecal matter. The presence of such bacteria in outdoor bathing places, however, may be largely due to generally harmless soil bacteria. The portion of the total coliforms of fecal origin vary radically in surface waters. Routine bacteriologic tests can differentiate between harmful and harmless contamination by determining the degree of fecal contamination present through fecal coliform density determinations. Where outdoor beaches are used, harmful contamination, defined as the fecal coliform density, may be caused by sewage from boats, individual dwellings, hotels, factories or other establishments, public sewerage systems, refuse dumping, warm-blooded animals, and bathers themselves.

Where water is proposed for beach use and will be dependent upon stream flow or lake circulation for cleansing and dilution, the maintenance of a constant and appreciable flow of water past the beach or impounding dam during beach use should be ascertained. Any small stagnant pool patronized by a number of bathers is certain to show bacteriologic pollution in considerable amounts unless disinfection is provided. While no specific amount of diluting water for outdoor beaches can be recommended, it is probably fair to say that less than 500 gallons per bather per day is too small a diluting volume without disinfection. APHA and CSSE Recommended Practice[18] states "the total number of bathers using a fill and draw swimming pool shall not exceed one person for each 500 gallons of water in the pool between complete changes of pool water without disinfection."

The "Becker" formula has been used in New York State[18] as a practical guide in determinding necessary volumes of diluting water. This formula is $Q = 6.25T^2$ where Q = quantity of water per bather and T = replacement period in hours. By this formula if the water circulation is such that the pool volume will be replaced in 8 hours, $Q = 400$ and the number of bathers permitted in 8 hours would be the capacity of the pool divided by 400.

Whether or not disinfection is employed every effort should be made to eliminate all sources of sewage pollution on small streams or lakes used for bathing and careful sanitary surveys of the watershed are recommended. It is, of course, desirable that bathing be limited to clear bodies of water and that muddy bottoms which will cause turbid water be avoided.

From the foregoing discussion, a derivation of bathing load to be used as a "rule of thumb" can be formulated with the following assumptions.

a) Where the replacement period has not and cannot be determined 500 gallons of water per bather per bathing period will be considered adequate dilution volume without disinfection.

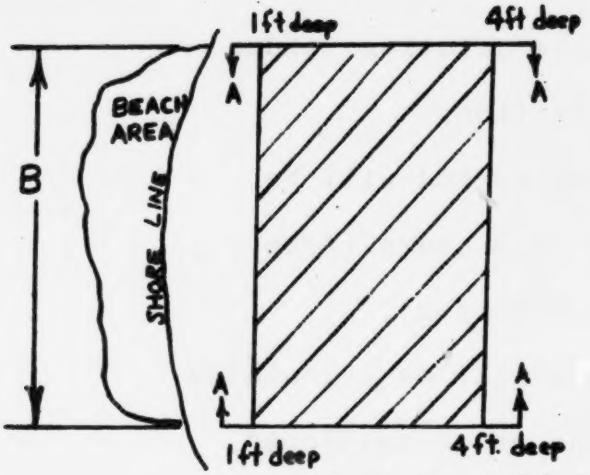
b) The bathing period will be considered to be 8 hours (from 11:00 a.m. to 7:00 p.m.)

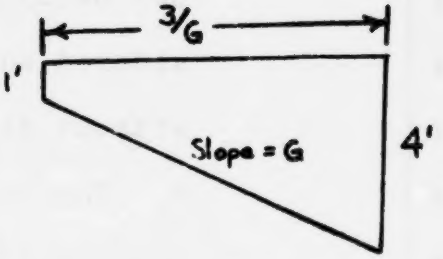
c) Pool volume will be calculated as shown by the cross-sectioned area below.

d) The minimum value for the average bottom slope (g) will be 0.03.

e) Where the beach curvature varies from a straight line radically, the responsible engineer may, according to his best judgment, use more complicated calculations in determining the pool volume.

f) Where the replacement period (T) is known the pool volume per bather per bathing period (v) will be determined by the simple calculation $v=500x\frac{T}{8}$


1ft deep
4ft deep
A
A
B
BEACH AREA
SHORE LINE
A
A
1ft deep
4ft. deep


3/G
1'
Slope = G
4'

SECTION AA

$$\text{Pool Volume (V)} = \frac{\text{Beach length (B) ft}}{\text{Average bottom slope (G)}} \times ((1\times3)\quad(3\times1/2\times3))$$

(perpendicular to beach line)

$$= \frac{B}{G}\,(3+4.5) = 7.5\,\frac{B}{G}$$

$$\text{V (gallons)} = \frac{7.5\ G}{G} \times 7.48 = 56\,\frac{B}{G}$$

Maximum Bather Load

$$\text{People} = \frac{56\ B}{G} \times \frac{1}{500} = 0.11\,\frac{B}{G}$$

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TRAVEL TRAILER PARKING

The great increase in the number of travel trailers on the highways during the vacationing months is quite evident to the motoring public and reflects the increasing amount of leisure time and extra spending power being enjoyed by more people each year. It also points out the need to keep pace by the development of adequate travel trailer parking areas and related facilities each year which meet accepted standards of health and safety.

Considerations involving accepted standards of health and safety are:

(1) Design of parking facilities for both self-contained and non-self-contained travel trailers.

(2) Provision of a sanitary station for the disposal of holding tank wastes.

(3) Design of travel trailer parking areas for overnight or destination use.

(4) Availability of adequate water

supply and satisfactory means of sewage disposal.

(5) Design of approach roads for trailer traffic.

(6) Conformance of the spacing of trailers to the minimum 15 foot separation specified by the National Fire Protection Association.

(7) Remoteness of the water tank filling station and the sanitary station from one another.

(8) Special provisions for the disposal of sink wastes.

(9) Development of detailed plans for refuse disposal.

(10) Convenience and adequacy of service buildings anticipated use.

(11) Provision of electrical service by underground cable.

(12) Submission of detailed plans and specifications of the travel trailer parking areas to the health authority having jurisdiction

for review and approval.

BOATING

The outdoor boating industry reported in 1962 that there are more than 8 million pleasure boats being used for recreation in U. S. waters and the trend is increasing upward. More and more of these boats are being equipped with a galley and toilet facility. Therefore, body wastes, galley wastes, and other debris are being discharged into our watercourses to threaten or damage the recreational values of swimming, fishing, and other aquatic sports. The dredging of boat basins and the construction of small craft harbors, marinas, boat launching ramps, and docking floats are but a few of the projects being constructed or planned for recreation areas. Such new developments which attract and serve boating enthusiasts may create water pollution and related health problems of concern to public health and recreation authorities. For this reason it is most important that the planning of such developments consider the environmental health aspects involved as demonstrated in the following:

(1) Inclusion of adequate separate facilities for collection and disposal of domestic sewage, waste oils and fuel and solid wastes in the planning and design of proposed marinas.

(2) Location of a permanent comfort station with sanitary facilities for both sexes near the piers.

(3) Provision of a water carriage sewage disposal system.

(4) Provision of a paved ramp for launching boats at both high and low water levels.

(5) Provision for land disposal of wastes from floating facilities.

(6) Provisions to eliminate waste and spillage during storage and dispensing of gasoline from floating facilities.

(7) Regulation of construction and use of boats with marine toilets.

(8) Inclusion of refuse disposal

practice, designation of restricted areas, safety requirements as recommended by the U.S. Coast Guard, and the control of health and accident hazards in boating requirements.

FISH-CLEANING FACILITIES

Fishing is an activity many visitors enjoy while visiting recreation areas, especially where natural reproduction and stocking of local waters is accomplished. Where fishing is productive, consideration should be given to the installation of fish-cleaning facilities near boat docking and launching areas. These facilities are essential to control nuisances, odor, and pollution from the indiscriminate cleaning of fish and the disposal of these wastes into lakes, reservoirs, and along shorelines.

In planning these units consideration should be given to the following factors:

(1) Screening or full enclosure of the facility.

(2) Provision of tables having

impervious, nonabsorbent surfaces sloping to central drains.

(3) Provision of potable water under pressure.

(4) Provision of adequate disposal of collected wastes and maintenance of the facility in a clean condition.

INSECT AND RODENT CONTROL

Several groups of arthropods and rodents may create serious public health and nuisance problems at recreation areas. These include species that are vectors of human disease organisms or which serve as reservoirs of these organisms or otherwise interfere with man's health, welfare, and comfort. A number of aquatic insects may be encountered at recreation areas located along the shores of impoundments. Mosquitoes are undoubtedly the most important of these insects, since several species serve as vectors of encephalitis and malaria, and others create public health problems because of their vicious biting habits.[19] Other groups of aquatic insects such as deer flies, horseflies, black flies, and biting midges are vicious biters of man and sometimes are involved in transmission of disease. In addition to the aquatic insects, people who visit water-related and other recreation areas are often exposed to terrestrial arthropods such as ticks, mites, fleas, and flies, and rodents including ground squirrels, rats, mice, and chipmunks.[20,21] The public health importance of these arthropods and rodents involves a number of human diseases including Rocky Mountain spotted fever, Colorado tick fever, tularemia, relapsing fever, tick paralysis, typhus, plague, bacillary dysentery, and typhoid fever. Irritation, discomfort, and annoyance caused by bites of the arthropods can seriously reduce the use of an otherwise attractive recreation area. Thus it becomes most important that measures be taken to eliminate or reduce such insect population.

These measures can be considered as follows:

(1) Contact with State and Federal health agencies for technical assistance in preparing control programs.

(2) Utilization of naturalistic

and source reduction measures.

(3) Delineation of low mosquito production potential areas.

(4) Implementation of mosquito control practices in preparation of the reservoir basin prior to impoundage.

(5) Planning for maintenance practices to control mosquito production within flight range of recreational and inhabited areas.

(6) Steps to be taken to control terrestrial arthropods and rodents.

(7) Hazards to humans and animals posed by proposed chemical control measures against insects and rodents.

CAMPGROUNDS, PLAYGROUNDS, AND PICNIC AREAS[22]

Camping is often a necessary part of any outdoor recreation outing that extends beyond one day. Many vacationers stay in motels and hotels; however, tents, travel trailers, and pickup campers have loomed larger and larger on the camping scene in recent years. Camping in the 1960's is increasing at a faster rate than the provision of sites and facilities for camping. Increases in camping will most certainly accompany increases in travel, for camping makes it possible for families to enjoy weekends and vacations economically far from home. Camping facilitates other outdoor activities, such as fishing and hunting. When resources are developed for such purposes, adequate facilities for camping also should be provided. A survey of participation in outdoor recreation conducted in 1959 and 1960 showed that about one-third of the campers enjoy camping in remote areas removed from other people, while about the same proportion enjoy camping in an area where they can visit with outer campers.[23] Consequently both types of camping areas are needed, with proper consideration given for environmental health factors relating to this mode of recreation. Campgrounds and picnic areas should be located in such a manner as to protect the areas that are needed for watershed, timber, range and other basic resources insofar as physically possible.

Other factors of importance are:

(1) Provision of level and well drained tent areas.

(2) Plans for regular maintenance of the grounds (cleaned, mowed, and poisonous plants removed.)

(3) Remoteness of playgrounds from traffic areas, hazardous topographic features and hazardous land uses.

(4) Convenient location of a water supply and comfort station in the area.

(5) Provision of a car parking space, a tent or vacation trailer area, a table and bench combination, and a fireplace for each campsite.

STABLE SANITATION

The primary environmental health concern associated with the use of horses is the stabling of these animals and related manure disposal. Accumulations of such wastes afford breeding places for flies, and unless controlled, will invariably produce large numbers of flies. Public health officials recognize that flies constitute a public health hazard and that the abatement of fly populations is essential to the control of certain communicable diseases.

These principles should be applied:

(1) Stables convenient to recreation areas, but located to minimize potential odor and nuisance problems.

(2) Provision of water outlets for hosing down feed and tack rooms.

(3) Provision of adequate water supply and drainage lines.

(4) Implementation of insect and rodent control practices.

(5) Application of a technique of manure disposal preventing the breeding of flies therein.

CONCLUSION

If these factors or principles have been considered and properly resolved then adequate health considerations have probably been included in the project development. If, however, many health factors are unfamiliar or have not received qualified attention then health considerations have not been adequately provided for in the project development. Inadequate consideration of the health aspects inherent in water resource and related land use development projects will mean the probable incorporation of health hazards in the project and a neglect of optimal resource development and optimal use of development funds. Health agencies at the local, State, and Federal level can be of considerable assistance in providing the technical direction necessary to ensure the inclusion of a healthful environment in the development of water resources.

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HEALTH GUIDELINES FOR WATER RESOURCE AND RELATED LAND USE MANAGEMENT

PART IV: VECTOR CONTROL

PRELIMINARY DRAFT
USPHS, DHEW
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I. Introduction

Health Guidelines for Vector Control are intended for the use of public health agencies, water resource construction and operation agencies, and for others. The Guidelines should assist in the study and evaluation of vector control problems and in the prevention and control of disease vectors and pests which may be associated with water and related land resources.

The Guidelines may be broken down into two categories:

1. Principles and Practices for the Prevention and Control of Vector Problems

2. Field Survey and Epidemiological Surveillance.

Major vectors considered include mosquitoes from the water resource and terrestrial arthropods and rodents from the related land resource.

II. Practices for the Prevention and Control of Vector Problems

In the prevention and control of vector problems, special emphasis must be placed upon the prevention of physical conditions which may result in increased vector populations and upon the establishment of physical conditions which will minimize or eliminate existing vector problems; attention must also be given to factors such as the maintenance of basic sanitation standards, programs for the application of insecticides, location of habitable areas away from potential mosquito production areas, and so forth. The following principles and practices for prevention and control of vector problems should be followed in the planning, design, construction, operation, and maintenance of water and related land resource projects.

A. Impoundments

Practices leading to the prevention and source reduction of mosquito and other aquatic insect breeding sites include the following:

1. All borrow pits and other potential ponding areas associated with construction of the dam, relocation of highways or roads, etc., which are located above maximum pool level should be made self-draining.

2. Prior to impoundage, the reservoir basin should be prepared as follows:

   a. The normal summer fluctuation zone of the permanent pool should be completely cleared except for isolated trees and sparse vegetation along abrupt shorelines which will be exposed to wave action.

   b. Dense stands of timber rooted below the normal summer minimum pool level but extending above that level should be cleared. In some situations, such timber may be felled and securely tied down in lieu of disposal.

c. Borrow pits, depressions, marshes, and sloughs which will be flooded by the reservoir at maximum pool level and which would retain water at lower pool levels should be provided with drains to insure complete drainage or fluctuation of water levels.

d. If the summer fluctuation zone of the permanent pool is limited to a few feet, consideration should be given to "building out" mosquito-producing areas located within flight range of population groups or recreation areas through the use of measures such as deepening and/or filling. This would minimize the need for repetitious measures for controlling vegetation and mosquito production.

3. After impoundage, the following maintenance measures should be carried out in all potential mosquito-producing areas

located within flight range of human population groups or recreation areas frequented by significant numbers of persons:

a. All dense vegetation should be removed periodically from flat, protected areas within the normal summer fluctuation zone of the permanent pool.

b. Vegetation,debris, and flotage should be removed periodically from all drains to insure free flows.

4. Water level management to minimize conditions favorable for mosquito production should be used to the maximum degree permitted by the primary purposes of the reservoir. This will minimize the need for repetitious measures for controlling vegetation and mosquito production.

5. As a general principle, waterside recreation areas, particularly those which have facilities for overnight

human occupancy, should be located along sections of the reservoir which have a low production potential for mosquitoes and other aquatic insects of public health importance.

6. Biological control measures such as maintaining populations of mosquito larva predators should be exercised as needed.

B. Terrestrial Arthropods and Rodents at Recreational Areas

1. Proper storage, collection, and disposal of solid wastes should be practiced in order to prevent and control flies, wasps, other noxious insects, rats, wild rodents, and other small mammals.

2. All buildings should be rodent proofed at recreation areas where rodents which may create public health hazards are prevalent.

3. Debris, rubbish, and other materials which may serve as

harborage for rodents and other small mammals should be removed periodically. At least twice a week removal of garbage is necessary to minimize fly production during the summer months. Where pit privies are provided, they should be fly tight and constructed to minimize the possibility of rodent harborage. Where possible such unsatisfactory facilities should be replaced with modern water carriage sewage disposal systems.

4. Brush and weeds along paths, trails, roadways, and other areas frequently used by visitors should be treated with herbicides or removed in order to reduce the likelihood of tick and chigger infestation. Insecticides should also be applied along paths or roadsides to control tick and chigger infestations but only in accordance with recommendations of appropriate Federal or State

agencies.

C. Waterfowl Refuges

1. Whenever possible, waterfowl habitat developments should be constructed so as to minimize mosquito problems.

2. Waterfowl areas which are to be flooded during the mosquito season should be diked or otherwise prepared with steep shorelines to preclude shallow water areas favorable for mosquito production.

3. Provision should be made for water level management in waterfowl areas which will minimize mosquito production.

D. Irrigation

1. Project Conveyance and Distribution Systems

a. Lining or other satisfactory seepage control measures should be provided for all sections of canals and laterals located in porous soil where excessive

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leakage would result in waterlogged areas, seeps, and ponds.

b. Drains should be installed to prevent ponding of excess irrigation water and natural runoff along the upper side of canals and laterals. All drainage crossing or inlet structures should be placed on grade to prevent ponding.

c. Borrow areas should be made self-draining to prevent the retention of ponded water.

d. Where possible, provision should be made to prevent idle turn-outs and other hydraulic structures from retaining residual water.

e. Effective measures should be provided to prevent ponding of leakage from water control structures.

f. Every effort should be made to establish delivery schedules which will provide farmers with adequate but not excessive amounts of water at proper intervals to insure efficient irrigation of the crops concerned.

g. Vegetation and debris which would retard normal flows should be periodically removed from conveyance channels, water control structures, and drains.

2. Project Drainage Systems

a. Trunk drainage systems should be installed to insure complete removal and proper disposal of excess irrigation water, natural runoff, and seepage from both irrigable and nonirrigable lands affected by the distribution and use of irrigation water on the project.

b. Drainage ditches should be designed, constructed, and maintained so as to minimize ponding in the channels and to insure free flows at all times.

c. Provision should be made to prevent water from ponding behind spoil banks.

d. Underdrains, culverts, inlets, etc., should be placed on grade to prevent ponding.

3. Irrigated Farms

a. The sponsoring agency and other organizations concerned with irrigation agriculture or mosquito control should encourage irrigation farmers to use the following irrigation and drainage practices which will prevent or minimize mosquito sources:

1) The farm supply system, drainage system, and field layouts should be properly fitted to the topography, soil, water supply, crops to be grown, and irrigation methods to be used.

2) All surface irrigated fields should be properly leveled or

graded to provide for efficient water application and removal of excess water without ponding.

3) An adequate drainage system should be provided for removal of excess water from all portions of the farm.

4) Irrigation methods should be used which will provide optimum irrigation efficiencies.

5) Application of irrigation water should be limited to the amount required to fill the crop root zone plus water to cover unavoidable losses and excess water needed to prevent upward movement of salts.

E. Farm Ponds

1. The pond basins should be cleared of trees, brush, and other dense vegetation prior to impoundage.

2. Ponds should be constructed with steep banks to discourage growth of

vegetation.

3. All dense vegetation should be removed periodically from shallow water areas.

F. Channel Improvements and Drainage

1. Borrow areas resulting from construction of the project should be made self-draining.

2. Material excavated from channels should be disposed of in such a way that it will not cause ponding of water.

3. Adequate drains should be installed to prevent ponding of water on berms or behind spoil banks, levees, and dikes.

4. Drainage ditches should be designed, constructed, and maintained to concentrate low flows and reduce silt deposition and subsequent ponding, thereby insuring free flows at all times.

5. Underdrains, culverts, inlets, etc., should be placed on grade to prevent ponding.

6. Collection sumps should be constructed with steep side slopes, and any emergent vegetation should be removed periodically.

7. Sections of natural channels that are cut off or bypassed by new channels should be filled or provided with adequate drains.

8. Interior drainage facilities should be well maintained to avoid excessive ponding.

9. The use of biological control measures such as stocking with the mosquito fish, _Gambusia Affinis_, should be used where feasible.

G. _Waterways, Terraces, Floodways, Diversion Channels, and Drainage Ditches_

1. Waterways, terraces, floodways, diversion channels, and drainage ditches should be designed, constructed and maintained to prevent the retention of ponded water or the creation of ponded areas which would be suitable for mosquito production.

2. Biological control measures should be used where feasible.

H. Supplemental Chemical Control Measures

1. In situations where adequate vector control is not obtained through prevention and source reduction measures, provision should be made for supplemental use of insecticides and rodenticides to achieve the desired level of control.

III. Field Survey and Epidemiological Surveillance

In order to insure that good principles and practices are actually being implemented, that vectors are being controlled, and that disease and nuisance is being prevented, arrangements should be made for routine field surveys and for epidemiological surveillance. The routine field surveys should include not only inspections for implementation of physical measures, but also inspections for the presence of adult and larval mosquitoes and other vectors. Regular information on vector populations or disease occurrence is essential in guiding control programs or instituting new programs to cope with existing vector problems as well as unforeseen or emergency situations.

Approximately one-half of the States now maintain full-time vector control specialists usually within the organization of State health departments. The Public Health Service also maintains vector control programs within the National Communicable Disease Center. Both State and Public Health Service vector control specialists can provide technical assistance in determining proper vector control measures which should be applied in the implementation of specific projects. For information regarding such technical assistance the State health department or appropriate regional office of the Public Health Service should be contacted.

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MR. STEIN: I hate to put you on after Mrs. Murray, because I know she is a terribly difficult one to follow.

MR. MARSHALL: I know, that was a tough one.

MR. STEIN: But Poole fooled us. He saved his trump card for last and we really had nowhere to go.

MR. MARSHALL: That was a real rough one to follow, too.

MR. STEIN: Before we recess, tomorrow will be Michigan's day. However, it is expected that Governor Knowles of Wisconsin will be here and President John Egan of the Sanitary District of Chicago. And when President Egan and the Governor come, they will be given an opportunity to present statements.

With that, we will stand recessed until 9:30 tomorrow morning.

(Whereupon, at 5:00 p.m., an adjournment was taken.)

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